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THE MONTH.

THE affairs of France continue to be in a state of doubt and uncertainty. The reaction has gone on too rapidly toward the monarchy, and at last accounts the tide seemed to be checked or even on the ebb. The fusion of the Legitimists and Orleanists accomplished so soon after the downfall of Thiers and the elections in various departments have rather frightened the much quarreling party of the left into good behavior. We hear little of M. Ranc or M. Barodet. Gambetta is as quiet as a mouse, and arrangements are said to be making for a public exhibition of him and M. Thiers in the fraternal act of embracing each other for the party's sake. A very unintelligible letter from one of the Republican journalists has drawn from Prince Napoleon an equally luminous reply from which—and some reports of elections which resulted in Republican successes—one may conclude that an alliance defensive and offensive has been formed between the Republicans and the Bonapartists. Such an event alone proves the utter worthlessness of all prophecy in the region of French politics. MM. Thiers, Rouher and Gambetta, clasping each other's hands and swearing eternal friendship, would be a curious spectacle enough, even if such an alliance of affection were not occasioned by the threatening advance of the Count de Chambord, borne on the shoulders of the sons of Louis Phillippe, and waving before them the insignia of the ancient monarchy—white flag, lilies and all.

IT is premature to speak of the trial of Marshal Bazaine. After an imprisonment, the horrors of which must have been very great—(for we read in a French journal that the government has steadily refused to grant the prisoner his repeated prayer for the services of his own cook—an artist, we understand, of extraordinary skill—and compelled him to subsist on viands sent from a neighboring café)—the Premier Marshal of the Second Empire has been brought to trial. The Court presided over by the Duke d'Aumale, lately returned from an exile of more than twenty years, is held in the Petit Trianon of Marie Antoinette. There the Marshal has been compelled to sit day after day, and listen to a long indictment prepared by General Riviere, in which his sins of commission and omission were dwelt upon without mercy and at length. The examination of witnesses has just begun, and it is impossible at the present to form any idea of the result. The composition of the Court is certainly not very favorable to the prisoner. The Duke d'Aumale, sitting in judgment on Napoleon's favorite Marshal, makes one wonder how a General of Cromwell's would have fared at the hands of Charles the Second.

CASTELAR seems to be making a good fight, but his task is Herculean. The two principal events, are the bombardments of Alicante and of Carthagena. The insurgent ships having appeared before the former place, and failing to bring it at once to terms, commenced a regular bombardment, which is said to have caused great damage, but did not compel it to surrender, and at length withdrew discomfitted. The inhabitants seem to have behaved well, and Senor Maisonave, who represented the Government, is reported as having borne a gallant part in the struggle.

At Carthagena, affairs are in a dreadful condition. The Government forces have completed their plans, and are pressing the besieged very closely. The expenditure of war material must be very considerable, if the contest be not very bloody; a correspondent giving us to understand that the fire from the forts is so constant that the vineyards and orchards in the environs of the town are in serious danger of destruction. A naval engagement has taken place in the harbor—one of the drawn battles so common in the annals of iron-clad navies—and at last accounts the blockade was still maintained by sea, and the siege by land, with

prospect of bringing the inhabitants speedily to terms. The Carlists have had another fight with the government forces, in which both claim a victory; but there are ominous rumors of a return to France of Don Carlos and his wife. His cause certainly does not look as favorably as it did a month ago. But we are altogether at the mercy of the cable news-man who is sometimes not to be relied upon.

From England we hear of Landseer's death. No painter of our time has achieved wider reputation or popularity, though it is to be doubted whether his tact in the choice of subjects and a certain subtle humor in dealing with them had not more to do with both popularity and fame than any skill he showed in his art. He was pre-eminently an English artist, with an Englishman's love of sport, of dogs and horses, of country life, and of aristocratic friends. A thorough man of the world, he was no less famous for his social than for his higher gifts. For some years he has been rapidly failing, and his death was not unlooked for. He was buried at St. Paul's.

Another eminent man has died within the month, the Spanish politician Olozaga. Born in 1803, he early left his profession of the law for politics. Frequently elected to the Chamber under all the changes of Spanish politics, he managed generally to keep on the winning side, although he was twice exiled for a time. Four times named minister at Paris, in 1838, 1854, 1868 and 1871, reporter of the Constitutional Commission of 1837, and chief of that of 1870, and finally President of the Cortes for some months, he achieved as many successes as any Spanish politician of the century. He died at Enghien in Belgium, where he has lived for the last year in complete retirement.

The Evangelical Alliance, as it is called, has caused some excitement by its meeting in New York. Representatives of most of the European countries, with a certain Mr. Sheshadri from Bombay, have been for a fortnight engaged in fraternal embraces and an interchange of views. The spectacle has been interesting, and the effect no doubt good. At one time five churches were crammed with the curious and the devout, and a multitude of

papers prepared for the occasion were read to attentive and enthusiastic audiences. The delegates have paid visits to Philadelphia and Washington, and are doubtless going home strongly impressed with certain features of American hospitality. During their visit to this city of fifteen hours' duration they were feasted only twice, so their ideas of our Philadelphian life may not be the same as those of an eminent stranger who recently said that "we come together to eat and go away to sleep." For this at least let us be thankful.

ONE of the most remarkable discoveries of modern times has recently been made in the East, if the Augsburg *Gazette* be worthy of belief. Dr. Henry Schliemann, a scholar of extraordinary attainments, has been for some time making explorations of the plain of Troy. Having carefully examined the various sites about which scholars disagree, the hill of Bounarbashi where Welcker places Troy, the hills of Ohiblak preferred by Barker Webb and Clarke, the ridge near Atzik-Koi, where Ulrichs thought he had discovered the ancient city and the spot which Strabo declared to have been the site, Dr. Schliemann enthusiastically announces that he has discovered at Novum Ilium in the plain half way between the range of Ida and the sea, undoubted proof of its being the Troy of Homer. Our knowledge of what he has really done is confined to some quotations from the Augsburg and Cologne Gazettes, containing letters from him and a comment from a Dr. Von Eckenbrecher—an archeologist of some reputation, who has himself explored the region and is on the whole rather favorable to Schliemann. After much excavating Dr. Schliemann writes that he came suddenly upon a copper object of singular form, which proved to be a dish in the form of a tray, a copper kettle, a plate, four silver vases, a bottle and a goblet of pure gold, and to bring a long list to an end, a mass of spear-heads, daggers and gold jewelry. The account of this remarkable discovery is rather confused and unsatisfactory, especially when the learned and enthusiastic doctor goes on to state that this is the treasure which was packed into the wooden box mentioned in the Iliad, as being in Priam's palace, the key of which he produces as conclusive proof of the assertion, for it reminds us of the old lady who refused, with indignation, to believe her son's story about

flying-fish, but accepted, without hesitation, his account of the wheel of Pharaoh's chariot which was brought up by his ship's anchor in the Red sea, because, as she well said, "we had Scripture for the proof of that." Dr. Schliemann supports his theory as to the situation of Troy by much that is weighty and of value, and if it be true that he has really dug up on the site of Novum Ilium, images of the Ilian Athene with the owl's head, made of marble, slate, bone and ivory, and innumerable vases, rings and bracelets decorated with the same figure, he has made, as we said at the outset, one of the most extraordinary discoveries of modern times, and one which certainly deserves, and shall receive in these pages extended notice. It is not only scholars and archeologists who will await more full accounts with interest and impatience.

THE Modoc leaders are at length hung, and the remnant of the tribe are on their way to new and greener pastures than the famous lava beds. The execution was witnessed by a thousand people, most of whom had personal feelings of revenge to gratify, though there were no doubt some persons, even in the wilderness of Northern California, capable of imitating my Lord Tomnoddy on such occasions. With the news of Jack's ignominious death comes the report of a great raid of the Cheyennes into Southern Colorado, to the terror of the settlers and the utter ruin of their homes. "Le roi est mort: vive le roi!"

THE financial crisis is now long enough past to let us have a view of it as a whole. The panic is over, even the draining from the saving banks, which was the last feature of it, but reasonable apprehensions are far from being set at rest. Stocks which had to a great extent recovered, have received a recent severe fall. Exchange is cheap, though the import of coin from England which was brought about by its stoppage still goes on. Of this cheapness very few are able to take advantage. The money stringency continues, and now individual catastrophes having in a measure ceased, the country as a whole is suffering more than most are aware, or than it is well for us, perhaps, that we should be aware. The manufacturers are dismissing their hands, and the merchants must be directly feeling not merely the inconvenience of a want of money but the further depression of a lessened trade.

We escaped the block in freights which the suspension of exchange seemed to threaten, and the railroads and canals are full. Fancy investments are out of the market, and for the time being financial confidence-men are frightened from their vocation; but that any person of fair intelligence anticipates a moral regeneration of the street cannot be supposed. The knowledge of finances and political economy which it appears has been attained to by the controlling mass of American business men and those still called, we believe, statesmen, is not a pleasing subject of contemplation. That especially unmeaning expression, "shrinkage of values," has been redundant, and the paternal system of national financiering has not seemingly lost many of its worshipers. The faith reposed in the national currency is triumphantly pointed at as conclusive in favor of the Boutwell policy, and we are told how bank-notes are being hoarded now as gold coin was in former crises; a want of elasticity is occasionally, it is true, conceded, and a voice of protest is even heard against beneficent interference in the affairs of Wall street on the part of the Secretary of the Treasury. But meddle the government will, the Fifth Avenue hotel interview to the contrary notwithstanding, and as certainly mar. General Grant believes in a return to specie payments, and as to what means Congress may not adopt with the notion of bringing that end about, it would be very unsafe to make a guess. A contraction would cripple us more than ever, and would be utterly inefficacious for the purpose. An inflation would palliate our present troubles, leaving us in doubt, however, whether the increase might not be more than we needed, entailing upon us a rise in prices with all the train of consequent evils we suffered from the same cause during the war, or whether it might not on the other hand be too little for our requirements, leaving us about as badly off as before; while of course any enlargement of the currency artificially produced, postpones so much longer the day of specie payments. A free-banking law, with provisoes protecting all issues of notes by means of U. S. bonds or other securities, is too simple and effective a plan to commend itself to the practical legislator. By such a law a return to gold and silver would naturally come about, if it is ever to do so; for while an arbitrary currency must necessarily be the only one in use, a natural currency, created according to our needs, if it did not help would at any rate not hinder resumption.

THE October election is over, and as we go to press enough is known to tell the result. Ohio seems to be doubtful, both parties claiming a victory. The Republicans have carried Pennsylvania as usual, but by decreased majorities, the present system making it a work of supererogation for the rank and file of the party to go to the polls. Judge Gordon is elected to succeed Judge Read, and we shall perhaps have an opportunity hereafter to know something about him. Ludlow, the democratic nominee, ran ahead of his ticket, which, as usual, is in a handsome minority, and can now add to its experiences of the past ten years, that of another well deserved defeat. The general vote is much lighter than that of last year, all of the parties having fallen off. To those who are sincerely anxious to see an improvement in the condition of public affairs, the most disappointing feature of the election is the smallness of the reform vote in the city. This may be accounted for in many ways. Without money, without a press, without experienced "workers," without a prize to give, or a friend among the officers of election, the Reform party could hardly have expected to achieve a great success. The work done for it is necessarily amateur work, and such is always fitful and ineffective. Pure motives and unselfishness do not constitute all the elements necessary to political success. Last year, too, there was a more active campaign and harder and more constant work was done. The Democrats had a bad ticket and there were many dissatisfied Republicans—both of which causes contributed to increase the Reform vote. This year, however, the Republican ranks were closed and the Democratic ticket was respectable, and the vote cast for the Reformers' candidates is a straight, test vote. It is unquestionably disheartening to see the control of the city given up entirely to the worst men of the Republican party, but there seems to be at present no escape. There is nothing to hope from the so-called leaders—the respectable men of the party who, dissatisfied as they are with the condition of affairs, are constantly looking for an indefinite future to work a miraculous change, but who have not the courage to seize upon the present and effect it by the means in their own hands—there is nothing to hope from the people who are honest only when untempted, who groan bitterly about corruptors and corruption, and yet will do nothing to purify the one or punish the other:—of course there is no balm in the

Democratic Gilead. Those who are sincere in their wish for Reform will do nothing to effect it, and those who have the power do not wish a change. The times are not yet good enough nor bad enough to awaken the people to their duty. The experience of this election will be of value to the Reformers in their labors for the future.

ON THE VALUE OF ORIGINAL SCIENTIFIC RESEARCH.

A DILAPIDATED house, or tattered and shabby garment may be noticed even by people whose powers of observation and reflection are weak. Thousands in the city can tell how very much in need of paving many of the streets are. Of these a goodly number are ready to repave the cartways—in front of their own houses—at their own cost, although they pay a tax sufficient to enable the municipal government to keep the cartways and footways of the town in order. But of this goodly number very few or any can be induced to contribute any thing for the improvement of common education. Still fewer appreciate the importance of scientific training and of original scientific research. And of those who fully appreciate such labors, the number who are able and willing to give money to foster the labors of those who toil to increase our knowledge of natural truth, the laws of nature, is very small indeed.

Many give liberally either to found, or to subsidize institutions already established for educational purposes, in which systematic instructions in general or technical knowledge are given for fees, paid by the instructed. The college for women, founded and endowed by Matthew Vassar, at Poughkeepsie, N. Y., is of this kind. But that far-reaching intelligence which benevolently provides means to assist and enable genius and talent, whether possessed by the opulent or by the needy, to toil in the paths which lead to discoveries in natural science, is of a high order and of rare occurrence. Of such character was that of Smithson, the founder of the "Smithsonian Institution for the acquisition and diffusion of knowledge among men," established at Washington.

Such gifts for such purposes are rare, for the reason that their

beneficent influence on the progress of civilization, a progress we all desire to accelerate, is not widely studied or justly appreciated. The value of original searches after hitherto unknown facts, pertaining to the organic and inorganic matter of the earth, and to the energies or forces which rule its forms and existence, is not easily demonstrated, even to highly intelligent people. Had Galvani and Volta been asked, in the concluding decade of the past century, what good they hoped to derive from making frogs' legs twitch by the application of different metals to their nerves, or trying to discover why a peculiar sensation is felt when the point of the tongue is placed between a piece of silver and a piece of copper in contact with each other, they could not have answered satisfactorily, even had they known that they were acquiring facts necessary to the foundation of the electric telegraph, and the creation of an occupation, a career for thousands of people in the future.

"But nearly all the grandest discoveries of science have been but the rewards of accurate measurement and patient, long-continued labor in the minute sifting of numerical results. The popular idea of Newton's grandest discovery is that the theory of gravitation flashed into his mind, and so the discovery was made. It was by a long train of mathematical calculation, founded on results accumulated through prodigious toil of practical astronomers, that Newton first demonstrated the forces urging the planets towards the sun, determined by the magnitude of these forces, and discovered that a force following the same law of variation with the distance urges the moon toward the earth. *Then*, first, we may suppose, came to him the idea of the universality of gravitation: but when he attempted to compare the magnitude of the force of gravitation of a heavy body of equal mass at the earth's surface, he did not find the agreement which the law he was discovering required. Not for years afterward would he publish his discovery as made. It is recounted that, being present at a meeting of the Royal Society, he heard a paper read, describing geodesic measurement by Picard, which led to a serious correction of the previously accepted estimate of the earth's radius. This was what Newton required. He went home with the result, and commenced his calculations, but felt so much agitated that he handed over the arithmetical work to a friend; then, (and not when sitting in a garden he saw an apple fall,) did he ascertain that gravitation keeps the moon in her orbit."*

*Address of Sir Wm. Thomson, President of the British Association for the Advancement of Science, at Edinburgh, August, 1871.

Faith in the accuracy of the judgment of men who are recognized by the community to be sagacious, honest and learned, gives authority to their expressions. Their views, in the estimation of the many, are as decisive and unquestionable as the decisions of the highest legal tribunals. In this sense, the following expressions of scientists and others well known to the public, may be received as evidence of the importance of scientific training and original scientific research, and be more influential perhaps than any attempt to adduce a detailed argument in satisfying those who doubt whether the study of the natural sciences is useful, and entitled to be encouraged and cherished in the community.

"Nearly all great modern scientific discoveries have been made by teachers of science, and others who spent a large portion of their lives in experimental investigation, searching for new truths, and not by persons who have hit upon them by accident. The greatest discoveries in physics and chemistry in modern times were made chiefly by such men as Newton, Cavendish, Scheele, Priestly, Œrsted, Volta, Davy and Faraday; all great workers in science.

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"Some kind of discoveries are made by observing the phenomena of bodies placed under special conditions by those operations of nature over which we have little or no control. All our knowledge of astronomy, and much of that of geology and physiology, was acquired in this way.

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"Discoveries differ from inventions; a scientific discovery is a newly found truth in science, which in the great majority of cases is not in the form of a saleable commodity, but may be used for the purposes of ordinary scientific instruction. An invention is usually a combination and application of some useful or desired purpose of scientific truths which have been previously discovered.

"Immediately a discovery is made, it becomes published and incorporated in all the ordinary text-books of science; and in this way such books have become filled with valuable knowledge acquired by researches in past times; and this accumulated learning is ready for dissemination by teachers of science, and for inventors to apply to useful purposes. All this knowledge (which is of enormous value and cost a vast amount of intellect and labor), has been given freely to the nation, without money and without price.

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"Scientific discovery has in all ages been a most powerful

agent of civilization and human progress. The discovery of the black liquid which a solution of nut-galls produces when mixed with green vitriol, led to the invention of writing ink; and knowledge of the properties of ink and paper prepared the way for the invention of printing, by means of which learning has been spread all over the earth.

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"Original research is more productive of new industries and inventions than any other kind of labor.

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"Even the invention of the steam engine was partly a consequence of previous researches of scientific men. Watt himself states, in his pamphlet entitled 'A Plain Story,' that he could not have perfected his engine, had not Dr. Black and others previously discovered what amount of heat was rendered latent by the conversion of water into steam.

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"Discovery is usually the basis of invention; a man cannot generally invent an improvement unless he possesses scientific knowledge, and for that knowledge he must in nearly all cases resort to a scientific book or teacher. Nearly all the pure scientific knowledge contained in books was obtained by original research, and the great bulk of valuable patented inventions was made with the aid of that information.

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"Nearly every manufacturer in this country is deriving from scientific discoveries advantages for which there has been little or no payment to discoverers. The makers of coal tar dyes and the dyers of wool and silk are using Dr. Mitscherlich's discovery of nitro-benzine. Manufacturers of picric acid and 'French purple' have enjoyed the fruits of the labors of Dr. Stenhouse. Makers of chlorate of potash are profiting largely by the discoveries of Scheele, Gay, Lussac and others.

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"There is not a man in this kingdom who has not derived some advantage, in one way or another, from scientific research. The advantages of gas-light, rapid postal service and transmission of goods, railway traveling, cotton apparel, photography, cheap pottery, improved medicine and surgery, Australian preserved meats, etc. etc., have been reaped more or less by every one, even the very paupers. Science has also, by developing new processes, given employment to whole armies of workmen in numerous arts, manufactures and occupations. About a quarter of a million of persons are employed on the railways, alone, of Great Britain, besides those who were engaged in their construction; and in the postal department alone of the telegraph service of this country, more than fifteen thousand operatives are employed. Chemical

works also find employment for twenty-six thousand, and gas-works for ten thousand work-people.

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"Of the great multitude of manufacturers, merchants, capitalists and land-owners in this country, who have derived such great pecuniary benefits from original scientific research, we believe there is scarcely a man existing who has ever given to a scientific society, institution or investigator, a single thousand pounds for the aid of pure research in experimental physics or chemistry; the nearest approach to exceptions are a very few wealthy persons, who have devoted themselves personally to scientific discovery. Many of these manufacturers and others would, however, willingly give money towards such an object, if they understood the value and necessity of scientific research." *See "The National Importance of Scientific Research," in The Westminster Review* (American Edition), *for April*, 1873.

"As man by the use of the telescope and other mechanical aids, can see objects which are beyond the reach of the natural vision, so, by the aid of science, he can extend his intellectual vision to things, laws and results, beyond the most distant conceptions of the uncultivated mind. A complete knowledge of the laws of nature, and of all their principles, comprises the whole circle of the sciences—intellectual, moral, social and political, as well as natural. The study and knowledge of the laws of nature, or many of them, including all the physical and mechanical, and a portion of the mental sciences, lie at the very foundation of all human improvement and progress."* EZRA C. SEAMAN.

"Action alone gives a man a life worth living; and therefore he must aim either at the practical application of his knowledge, or at the extension of the limits of science itself. For to extend the limits of science is really to work for the progress of humanity.

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"Knowledge is power. Our age, more than any other, is in a position to demonstrate the truth of this maxim. We have taught the forces of inanimate nature to minister to the wants of human life and the designs of the human intellect. The application of steam has multiplied our physical strength a million fold; weaving and spinning machines have relieved us of labors, the only merits of which consisted in deadening monotony. The intercourse between men, with its far-reaching influence on material and intellectual progress, has increased to an extent of which no one could have even dreamed within the lifetime of the older among us.

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*Essays on the Progress of Nations, in Civilization, Productive Industry, Wealth and Population, etc., etc. By Ezra C. Seaman. New York, 1852.

"Accordingly every nation is interested in the progress of knowledge on the simple ground of self-preservation, even were there no higher wants of an ideal character to be satisfied; and not merely in the development of the physical sciences, and their technical application, but also in the progress of legal, political and moral sciences, and of the accessory historical and philological studies. No nation which would be Independent and influential can afford to be left behind in the race. Nor has this escaped the notice of the cultivated peoples of Europe. Never before was so large a part of the public resources devoted to universities, schools and scientific institutions.

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"In fact, the men of science form, as it were, an organized army, laboring on behalf of the whole nation, and generally under its direction and at its expense, to augment the stock of such knowledge as may serve to promote industrial enterprise, to increase wealth, to adorn life, to improve political and social relations, and to further the moral development of individual citizens. After the immediate practical results of their work we forbear to inquire; that we leave to the uninstructed. We are convinced that whatever contributes to the knowledge of the forces of nature or the powers of the human mind is worth cherishing, and may, in its own due time, bear practical fruit, very often where we should least have expected it.

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"When young Galileo, then a student at Pisa, noticed one day during divine service a chandelier swinging backward and forward, and convinced himself, by counting his pulse, that the duration of the oscillations was independent of the arc through which it moved, who could know that this discovery would eventually put it in our power, by means of the pendulum, to attain an accuracy in the measurement of time till then deemed impossible, and would enable the storm-tossed seaman, in the most distant oceans, to determine in what degree of longitude he was sailing.

[This discovery of Galileo was the foundation of the invention of clocks and watches.]

"Whoever, in the pursuit of science, seeks after immediate practical utility, may generally rest assured that he will seek in vain. All that science can achieve is a perfect knowledge and a perfect understanding of the action of natural and moral forces. Each individual student must be content to find his reward in rejoicing over new discoveries, as over new victories of mind over reluctant matter, or in enjoying the æsthetic beauty of a well-ordered field of knowledge, where the connection and the filiation of every detail is clear to the mind, and where all denotes the pres-

ence of a ruling intellect; he must rest satisfied with the consciousness that he too has contributed something to the increasing fund of knowledge on which the dominion of man over all the forces hostile to intelligence reposes. He will, indeed, not always be permitted to expect from his fellow men appreciation and reward adequate to the value of his work. It is only too true, that many a man to whom a monument has been erected after his death, would have been delighted to receive during his lifetime a tenth part of the money spent in doing honor to his memory. At the same time, we must acknowledge that the value of scientific discoveries is now far more carefully recognized than formerly by public opinion, and that the instances of the authors of great advances in science starving in obscurity have become rarer and rarer. On the contrary, the governments and peoples of Europe have, as a rule, admitted it to be their duty to recompense distinguished achievements in science by appropriate appointments or special rewards."*

"We cannot over-estimate our debt to the men who give their lives to the sincere study of nature. They are becoming more and more our leaders in this morning twilight of knowledge, this period of transition, when the eye is getting the better of the ear, the reason of the imagination, our trust in the established order of the universe of those terrors of the supernatural, out of which have been forged the chains of thought and the weapons of tyranny." *Letter of Dr O. W. Holmes, Jan.* 28, 1873.

"In an age and country which boasts of its intelligence, it might seem superfluous to say a word in regard to the importance of the cultivation of science, or, in other words, of a knowledge of the laws of the phenomena of the universe of which we form a part; yet it is lamentably the case that few comparatively—especially among statesmen and politicians, even among those devoted to literature and the fine arts—properly appreciate the influence of abstract science on the present condition of the civilization of the world. Living in the present, enjoying its innumerable comforts and facilities of life, they do not realize the conditions of the past, or, if they imperfectly realize them, the changes are attributed to fortuitous circumstances really exercising a subordinate influence, or to apparent proximate causes, such as the immediate practical application of science and art."—*Letter of Professor Joseph Henry, Feb.* 3, 1873.

"I remember to have been much struck, in reading the memoirs

*On the relation of Natural Science to General Science Academical Discourse delivered at Heidelberg, November 22, 1862, by Dr. H. Helmholtz, sometime Prorector.

Popular Lectures on Scientific Subjects. By H. Helmholtz, Professor of Physics in the University of Berlin. D. Appleton & Co. NewYork, 1873.

of Prof. Silliman, with his account of an interview which he had with Mr. Webster, when that great lawyer and statesman was making his last journey from Washington to the State of Massachusetts, where he soon afterward died.

"Mr. Webster said to Prof. Silliman, whom he chanced to meet on this journey (they were old acquaintances), 'I have given my life to law and politics. Law is uncertain, and politics are utterly vain; but there is a noble certainty in science which commands my admiration, and I should be willing to spend my remaining days in the study of science.'

"Mr. Webster, as we all know, then represented in himself all that was most successful and most brilliant in the career of a statesman, in the profession of the law, in the oratory of the Senate, and in popular applause; and yet, in the sincerity of his heart, burdened by the weight of his cares and his troubles, filling, as he did, the highest civic place in the country except the presidency, he bent readily to the shrine of science, and admitted the solemnity and certainty of its truths."

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"Practical sciences, it was noticed by Dr. Johnson, it seems to me with some sense, are not necessarily those that have to do with the final and immediate material uses of society, in the sense in which that term is generally employed. Dr Johnson said that when these practical sciences, so called, came up for use once in common life and among common men, moral and intellectual sciences, or the power of using their own faculties and making them obedient to the occasions of society, came up for use a hundred times. And it is in those higher departments of science which you [addressing Prof. Tyndall] have illustrated to the common intelligence of our people, that we perceive that the most practical thing, for the good of society and of large masses of men, is the power to use the mind, trained to the highest culture and disciplined to the more prosperous results, that constitutes the practical education that society needs, and which society will most honor when it sees these resources exhibited in its behalf."
—*Speech of Wm. M. Evarts, Feb.* 4, 1873.

"It would be a great thing, sir, for this land of incalculable destinies, to supplement its achievements in the industrial arts by those higher investigations from which our mastery over nature and over industrial art has been derived, and which, when applied in a true catholic spirit to man himself, will assuredly render him healthiér, stronger, purér, nobler than he now is. To no other country is the cultivation of science in its highest forms of more importance than to yours. In no other country would it exert a more benign and elevating influence. What then is to be done

towards so desirable a consummation? Here I think you must take counsel of your leading scientific men.

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"The Royal Institution gives lectures—indeed, it lives in part by lectures, though mainly by the contributions of its members and the bequests of its friends. But the main feature of its existence —a feature never lost sight of by its wise and honorable Board of Managers—is that it is a school of research and discovery."

[The Royal Institution of Great Britain, for diffusing knowledge and facilitating the general introduction of useful mechanical inventions and improvements, and for teaching, by courses of philosophical lectures and experiments, the application of science to the common purposes of life, was formed in the year 1799, and incorporated by royal charter in 1800, under the patronage of his majesty George III. In this institution, situated in Albemarle street, London, Sir Humphrey Davy, Michael Faraday, W. T. Brande, John Tyndall and others, have made discoveries of vast importance to mankind—discoveries which might not have been made without just such means and facilities as this institution affords in its laboratories, museum and library, to men trained to seek in the realms of nature whatever is not yet known.

Its organization includes, besides president, vice president, secretary, treasurer, etc., patrons, members, honorary and life members, and annual subscribers. A board of fifteen managers and a board of fifteen visitors are elected annually. They appoint the professors and employ the lecturers, who are paid for their services. Members pay an initation fee of five guineas ($25), and an annual contribution of five guineas ($25), or sixty guineas ($300) in commutation of initiation fee and annual payments for life. Annual subscribers pay one guinea initiation and five guineas annually. Courses of lectures are delivered from Christmas till midsummer, to which members and annual subscribers are admitted, and each member is privileged to attend the weekly meetings and introduce two friends. The public is admitted to the courses of lectures at the rate of a guinea, or a half-guinea for each course, according to its length.

The annual contributions amount to about $24,000, and the receipts from lectures to about $5,000. The cost of lectures is say $2,700, current expenses $7,000, salaries $3,000, laboratory expenses $4,000, besides the salaries of the professors.

The Academy of Natural Sciences of Philadelphia resembles the Royal Institution in being a school of research and discovery, in living exclusively by the contributions of its members and bequests of friends, in holding weekly meetings, and publishing their proceedings and the results of their investigations. The current income of the Academy is about $3,500, and no more than meets its current expenses. Members of the Academy pay an initiation fee of $5 and a semi-annual contribution of $5, or $105 in commutation of initiation fee and semi-annual contributions for life. Persons not members are admitted to membership, if not ineligible, on the payment of $250 to the building-fund, and are placed on the footing of life members.

The Academy holds in trust a fund established by A. E. Jessup, E. A Jessup and Clara J. Moore, because they believed it was the intention of their father, Augustus E. Jessup, to have bequeathed to the Academy $120 a year to aid in defraying the expense of its publications, and $480 a year "to be used for the support of one or more deserving poor young man or men who may desire to devote the whole of his or their time and energies to the study of any of the natural sciences." Mr. Augustus E. Jessup died December 17, 1859. Since March, 1860, his children have paid yearly $600, until last year, when they transferred to the Academy ten thousand dollars in seven per cent. bonds. Up to this time twenty-four persons have been beneficiaries of the Jessup Fund.[1]

They have been systematically instructed under the directions of the curators, Professors Leidy, Cope and others, who receive no compensation for their instruction. Several of these beneficiaries have acquired distinction in the field of the natural sciences; some of them fill professorial chairs, and all are gratefully indebted to the founders of the Jessup Fund.

The want of a lecture-room and laboratory prevents the Academy from instituting courses of lectures and experimental researches. Hereafter, when the building, now in process of erection, shall be entirely completed with its lecture-room and laboratory, it will resemble still more closely, in its purpose and manner of working,

[1] Besides the Jessup Fund, there is the Stott Fund, which netts $114; the Isaac Barton Fund, $240; the T. B. Wilson Fund, $570 (for payment of librarian and subscriptions to "periodicals"), and the Publication Fund $210.

"The Royal Institution," though it may never compare with it in the brilliant results of its labors.]

* * * * "The willingness of American citizens to throw their fortunes into the cause of public education is without a parallel. Hitherto their efforts have been directed to the practical side of science, and this is why I sought in my lectures to show the dependence of practice upon principles. On the ground, then, of mere practical, material utility, pure science ought to be cultivated. But, assuredly, among your men of wealth there are those willing to listen to an appeal on higher grounds, to whom, as American citizens, it will be a pride to fashion American men so as to enable them to take their places among those great ones mentioned in my lectures. Into this plea I would pour all my strength. Not as a servant of mammon do I ask you to take science to your hearts, but as the strengthener and enlightener of the mind of man.

"Might I now address a word or two to those who, in the ardor of youth, feel themselves drawn toward science as a vocation? They must, if possible, increase their fidelity to original research, prizing far more than the possession of wealth an honorable standing in science. They must, I think, be prepared at times to suffer a little for the sake of scientific righteousness, not refusing, should occasion demand it, to live low and lie hard to achieve the object of their lives.

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"I loved my work, and entertained the sure and certain hope that, armed with knowledge, one can successfully fight one's way through the world.

"It is with the view of giving others the chance that I then enjoyed that I propose to devote the surplus of the money which you have so generously poured in upon me, to the education of young philosophers in Germany. I ought not, for their sake, to omit one additional motive by which I was upheld at the time here referred to—that was a sense of duty. Every young man of high aims must, I think, have a spice of this principle in him. There are sure to be hours in his life when his outlook will be dark, his work difficult, and his intellectual future uncertain. Over such periods, when the stimulus of success is absent, he must be carried by his sense of duty. It may not be so quick an incentive as glory, but it is a nobler one, and gives a tone to character which glory cannot impart. That unflinching devotion to work, without which no real eminence in science is now attainable, implies the writing at certain times of the stern resolve upon the student's character—'I work, not because I like to work, but because I ought to work.' In science, however, love and duty

are sure to be rendered identical in the end."—*Speech of Prof. Tyndall, Feb.* 4, 1873.

That a leading scientist of Great Britain, Professor Tyndall, should magnanimously bestow a considerable sum of money ($13,000) as a permanent fund toward educating, in Germany, young American citizens to be original investigators, is as remarkable as it is admirable. This Tyndall fund must become an unfailing source of gratification and benefit to individuals whom their benefactor can never know, and possibly be the origin of discoveries of value to all mankind. Such devotion of his money is a palpable proof of Mr. Tyndall's regard for citizens of the United States, as well as of his sincerity in wishing to accelerate the progress of scientific research, by increasing the number of well-trained laborers, and implies his opinion that Germany contains nurseries for young scientists which are better than those of any other country known to him.

The accuracy of this judgment may not be questioned now. But such a judgment of such a judge ought to be an influential reason why measures should be at once taken to prevent it from being always unquestioned. Is it not possible to augment in this city, as well as elsewhere in the United States, the means and facilities needed to thoroughly train young men in the ways of seeking natural truth not yet discovered? Must we always send our scientifically disposed brains abroad to Germany or other foreign land to be cultivated and fitted for the highest scientific applications? The sooner we provide at home, within the limits of the United States, for the cultivation of American brains to the full extent of their capacities, the better for American progress in science and civilization.

Such provision as alluded to here cannot be made in a day, nor without earnest labor long continued, nor without expenditure of large sums of money, though not as large as required to run a line of steamships or extensive railroad. Those who establish steamship and railroad accommodations invest their money, not that multitudes may travel safely, quickly, luxuriously or cheaply, though all these advantages are incidental to their establishment, but in expectation of satisfying dividends in the future. No such motive invites capitalists to establish or foster centres for the promotion of high scientific culture or research. Dividends from

investments for such purposes do not accrue to the investors. They are diffused in substantial benefits to the human race of the present as well as of future time. In the electric telegraph the whole world is now enjoying a result of the labors of all those who in the past hundred years have sought to discover the sources and laws of electricity; and the whole world will continue to utilize the discoveries made in this field, though the discoverers receive less credit or admiration than is given to inventors of machinery, to painters of landscapes, portraits or other pictures, or to the sculptor who moulds his marble to be an accurate copy of the human shape, life-like in the expression of some emotion, as grief, or shame, or joy. Yet a century's art-work in music, in marble and on canvas, admirable and delightful as it is, has scarcely influenced the march of the world's civilization. But the century's purely scientific work is perceptible in every path of social progress. Men are more comfortable in their homes; the average duration of their lives is longer; their moral conditions are better; bigotry, religious intolerance, superstitions of all kinds, including faith in witches, national prejudices have dwindled, not through "the works of the old masters" or the works of their successors, or through the influence of all of Italian art, ancient and modern, but because scientists within two hundred years have discovered the laws of gravitation, the laws of the natural forces called light, heat, magnetism, electricity, laws which have been utilized by ingenious men, producing telescopes, microscopes, photographs and light-houses; ocean steamers, locomotives, mills, mariner's compasses and electric telegraphs, ordnance and ordnance stores, such as no man in the last century ever dreamed could be. And yet it is probable that what has been discovered is nothing compared with what remains to be ascertained through the labors of naturalists, armed as they now may be with vastly improved instruments of observation and knowledge of methods acquired by their predecessors, and encouraged by a better appreciation of their work. An instance of such encouragement may be mentioned. Recently Mrs. Elizabeth Thompson, of the city of New York, has given one thousand dollars to the "American Association for the advancement of science," "for the purpose of advancing scientific original research," announcing at the same time her intention to contribute an equal amount annu-

ally as long as she lives. May her years of life be as many as those who live longest!

True science, like pure Christianity, is for the common good of all mankind. Such gifts as Professor Tyndall and Mrs. Thompson have recently made to promote the progress of original scientific research are perfectly unselfish; they cannot reasonably expect any return to themselves. No suspicion that hope of reversionary profits in a remote future prompts such gifts.

"At the time of the American Revolution, there resided in the town of Rumford, N. H., one Benjamin Thompson, who occupied himself in teaching a school. He embraced, as we Americans would say, the wrong side of the question on that occasion—he sided with the King's government. He went to England, became a man of mark, and was knighted. Then he went on the continent, again distinguished himself by his scientific attainments, again was titled, and this time, in memory of his American home, was called Count Rumford.

"On his return to London, Count Rumford founded the Royal Institution, and thus to a native American the world owes that establishment which has been glorified by Davy, and Young, and Faraday, and the lustre of which is now so conspicuously maintained by Tyndall. Had it not been for Rumford, Davy might have spent his life in filling gas-bags for Dr. Beddoes' patients, Faraday might have been a book-binder, and certainly Tyndall would not have been honoring us with his presence to-night."—*Speech of Professor Draper, Feb.* 1873.

"It is to be borne in mind in the sense in which we are employing it now—in the higher sense, rather—is such a love for truth, pure and simple, that a man will find it, hold it, and teach it without any regard to the social, the civil, or the theological results which may flow from it. * * * They [our fathers] took the ground that there would be no incompatibility between religion and all true knowledge. They believed that there could be no sound and manly religion without intelligence, and that there could be no satisfying intelligence whose roots did not ultimately run back to the moral and spiritual nature of man. And I may say from the settlement of New England to this hour—not confining my remarks to the New-England colonies, but applying them to all the early colonies—the most distinguished preachers of religion have likewise been the patrons and the fosterers of science, and that the leading scientific men in America, have been ordained clergymen. * * * * You should consider likewise, that the preachers of religion are, to a certain extent, educated to suppose that religion consists in its instruments rather than in itself, and

that to a large class religion means the Church, the usages of the Church. It is as if the farmer should be taught that the harvests were ploughs and harrows, hoes and spades! Without these there would be no harvest: but they are not the harvests. I hold religion to be a personal thing. It is but another name for manhood. * * * Nor am I deterred from saying this, saving the presence of many, from the fact that it was said before me by Paul himself —a gentleman every inch, and worthy to have lived in our times. But it was not his fault that he was born so far back. * * * I say, therefore, that in regard to religion—it being manhood in perfect development—that we have no fears of the incursion of science. It has made several onsets. There was a time when religion would not allow the world to turn round, and made the sun do all the jogging. But it was found out that religion did not demand any such thing, though men did who served it; and that is given up. There was a time when men looked upon the gaps and chasms in geology and the inferences which were deduced from it with the utmost alarm. That time has passed by.

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"There is no antagonism between Nature and the Bible, and I believe that all that is necessary to prove this is to trace the declarations of Scripture back to the things to which they refer. I believe that, when the word of God is interpreted by nature, it will come to men as so much light. Hence I hold that there is not the slightest reason to fear that religion will be overthrown by the investigations of science. If I held an old and tottering theory that I half doubted myself, I should be afraid of science and should say: 'Don't come here with your jarring wheels; you may shake this down;' but, if I held a theory that I firmly believed in, I should not be afraid of science. If a man has faith in his religion, he ought not to fear tests. I believe in manhood; in its power of expansion; in a great and all pervading atmosphere, by which whatever is least animal and most spiritual in man is perpetually developed and carried to unknown heights. Therefore I hail the discoveries, every single one of them, which science is making; and when these discoveries, one after another, shall have been so brought together that they can throw light upon obscure places, if they oblige us to change a theory or doctrine, if they make it necessary to alter our philosophy, we love truth so much that we will change anything for the sake of truth, though we will change nothing for any other reason.

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"What we want is a condition of society in which men can be *men*. We want generations of men; and whatever a man may be hereafter, I do not believe that, without good bodies, manhood can be very strong in low conditions of society. So that every-

thing that science does to make living easier among the common people, to make better bone, and nerve, and muscle, to improve the economy of life, to make a man better even in this world, it is working right in the direction of true religion.

"I do not say that good sewerage is gospel, but I say that bad sewerage is heresy. I do not say, sir, that you are a gospel preacher, because of your investigations into the properties of light and heat, but I say that badly-lighted alleys are haunts of crime, and that in cities light and warmth and circulation of air are eminently moral blessings. You may put churches within three rods of each other all through our streets, but you cannot preach down a stench. If men drink poisons at every pore, preaching will not redeem them from the consequences which intemperance entails upon them. You cannot violate the laws of God in a man's body, and make up for it by presenting the laws of God to a man's conscience. In dealing with man you must take him as he is all around. Therefore, I say that we need science to teach us a larger humanity and a better social economy; and every step in advance in that direction is a step toward true religion in the future."—*Speech of Henry Ward Beecher, Feb.* 4, 1873.

"There is room enough for science and religion both; for real science, and real religion. I cannot answer for everybody, but the religious people with whom I happen to be best acquainted are certainly not all jealous of science. They are not afraid even of this science of nature, to which the term 'science' is just now too exclusively applied. What have we in nature but the thoughts of God incarnated? And is not thought older and grander than all utterance of thought? Had there been no Ictinus and Callicrates, there had been no Parthenon. Had there been no God, there had been no nature. We have high authority for saying, 'The undevout astronomer is mad'. All are mad who look at nature without looking *through* nature up to nature's God. And so we find that in general the deepest students of nature have been likewise the most devout. Science is not so narrow a term as some men seem to think it. If there be a science of physics, there is also a science of metaphysics. Both of them are in pursuit of facts; hard facts; the former, the facts of observation; the latter, the facts of consciousness. Our intuitions of the true, the beautiful and the good, are just as real as light or heat, oxygen or granite."—*Speech of Prof. Hitchcock, Feb.* 4, 1873.

"So many and brilliant have been the discoveries of modern research, and so fertile their uses in practical application, that the personal agents of its success appear, not only as our benefactors, but as something more. For they who penetrate the roaring furnaces of the sun, where light and heat are generated, who dig in

the rayless caverns of the earth, where water-drops crystalize into jewels, who civilize the lightnings, and ride on the boisterous chariots of the winds, do not verify, but surpass the out-worn fables of more than mortal agency. The men of science, in fact, are now the only magicians whose will the spirits of the air, the naiads of the streams, and the gnomes of the caves obey, and who, like Prospero, in his enchanted island, exert the charms of supernatural might. The monstrous calibans, bred of nature's malignity and dissonance, they tame to human service; the delicate ariels, 'spun of fragrance and melody,' they speed on helpful messages around the earth, and into the dumb, dead, destructive forces of the elements as well as into the commonwealth of men, they infuse a beneficent order and rational purposes. You see then, Mr. President, that, true to my professional function as *laudator temporis acti*, or general eulogist of what is passing, I am entirely orthodox in my estimate of the worth of science. I rejoice as much as any of the gentlemen who have already spoken in its advances. Science is to me not only a proof of man's intellectual superiority, and the seal of his emancipation from tyranny of ignorance, but the pledge of an unimaginable progress in the future."—*Speech of Parke Godwin, Esq., Feb.* 4, 1873.

"Object teaching is beginning to be introduced, if only sparingly, into our primary schools. It should be introduced universally. And in all our schools, but especially in those in which the foundation is laid of what is called a liberal education, the knowledge of visible things should be made to precede the study of the artificial structure of language, and the intricacies of grammatical rules and forms.

"The knowledge of visible things—I repeat these words that I may emphasize them, and when I repeat them, observe that I mean *knowledge* of visible things, and not information about them —knowledge acquired by the learner's own conscious efforts, not crammed into his mind in set forms of words out of books."—*Address of Professor Fred. A. P. Barnard, on "Scientific Education," Feb.* 4., 1873.

A knowledge of material things is easily acquired when submitted to examination of the senses; a horse, mule or ass, once seen are ever after recognized, but a written description of those animals, committed to memory, would not enable one who had never seen them, to know and distinguish the horse, mule or ass, when he should meet them for the first time, though his information about them from written description, were entirely accurate. This fact, almost of itself, constitutes a conclusive argument in favor of having large collections of natural objects, easily accessi-

ble by people of all ages and every social position, as a most efficient means of general primary instruction. A great museum is a great implement for teachers; but yet more valuable for self-teaching adults, that is, using the word museum in its true and ancient significance—a place of learned occupation or study—and not in the modern or rather too popular sense of a place in which are collected chiefly animal monsters and effigies of strange and curious things, waxen caricatures of noted men and women, mechanical puzzles, where sensational dramas and juggling tricks are performed, aided often with very plain music to enhance the attraction—in a word, a wondermonger's device to allure the curious and gaping many to amusements, which shall be cheap and satisfactory to them, but lucrative to the showman.

For such a show, found perhaps in every one of our populous cities, one great museum, properly so called, should be substituted; a museum so arranged as to be prepared to supply whatever illustrations may be necessary for teaching systematically so much of the natural sciences as belongs to a liberal education, as well as the numerous and various specimens of the same object necessary for the work of the original investigator, specimens that may be kept conveniently for the purpose in a small space in drawers, boxes or closets. Such a museum becomes a supplement, or rather, complement, fulfilment to the college, and may be a proper resort of the pupils of all the educational institutions of the place at stated times. The museum which is suitably furnished to answer the requirements of the original investigator as well as the purposes of the systematic teacher and his pupils is also well adapted for popular inspection. A great museum is valuable in a popular sense both to adolescents and adults, and is always an attractive place of resort.

The boy or youth to whom book-studies are repugnant—and there are many of this sort—who is never able to separate an idea from the words that contain it and make it his own, chiefly through a sort of habitual indolence of mind rather than want of mind which leads him to believe that there is nothing in books worth the labor of learning, is sometimes made to suspect his error while surveying the contents of a museum. He is fascinated with this or that object or class of objects. His attention

is roused. The dawn of his intelligence is broken. He asks information about what has interested him, and is as alert in listening to answers as a stranger, lost in a maze of streets, inquiring the route to his lodgings. He sees, and remembers what he sees; and suspects there is, in natural objects, more to admire than in any description or portrait of them, however faithful the likeness may be. He perceives the pith of a Dutchman's remark while pointing out the brilliant colors of a humming bird he had to sell, that "nature is as good a painter as anybody!"

Where may the brilliancy and contrast of colors be better seen than in the plumage of birds, on the surface of shells and in the sheen of minerals and gems! There are beauties of form in endless variety in animals of every class, which, though inferior in common estimation to those of the human face and figure, are worthy of admiration. The contemplation of such things are as likely to beget in the mind reflections and memories as healthful and substantial as are works of art, paintings and statuary, which are most sought and admired. Nothing in a great museum of God's works fastens in the beholder's memory a sensual thought; possibly this cannot be truly said of all the specimens of art exposed to common view in European galleries.

"The toast, sir, to which you ask me to speak is, 'The relation of science to political progress.'

"Now, sir, I maintain that the true spirit of scientific research —incarnate before us in our honored guest—embracing, as it does, zeal in search for truth, devotion to duty which such a search imposes, faith in good as the normal and necessary result of such a search—that such a spirit is, at this moment, one of the most needed elements in the political progress of our country.

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"We are greatly stirred at times as this fraud or that scoundrel is dragged to light, and there rise cries and moans over the corruption of the times; but, my friends, these frauds and these scoundrels are not the 'corruption of the times.' They are the mere pustules which the body politic throws to the surface. * * * The disease is below all this, infinitely more widespread.

"What is that disease? I believe that it is, first of all, *indifference*—indifference to truth as truth; next, *skepticism*, by which I do not mean inability to believe this or that dogma, but the skepticism which refuses to believe that there is any power in the universe strong enough, large enough, good enough to make the

thorough search for truth safe in every line of investigation; next, *infidelity*, by which I do not mean want of fidelity to this or that dominant creed, but want of fidelity to that which underlies all creeds, the idea that the true and good are one; and finally, *materialism*, by which I do not mean this or that scientific theory of the universe, but that devotion to the mere husks and rinds of good, that struggle for place and pelf, that faith in mere natural comfort and wealth which eats out of human hearts all patriotism, and which is the very opposite of the spirit that gives energy to scientific achievement.

"I might speak of this quickening influence of one body of men—five hundred strong—assembled in one of our newer institutions of learning. But that influence extends far beyond those who stand in institutions of learning. The reverence for scientific achievements, the revelation of the high honors which are in store for those who seek for truth in science—the inevitable comparison between a life devoted to that great, pure search, on one hand, and a life devoted to place-hunting or pelf-grasping on the other—all these shall come to the minds of thoughtful men in lonely garrets in our cities, in remote cabins on our prairies, and thereby shall come strength and hope for higher endeavor."—*Speech of Andrew D. White, President of Cornell University, Feb.* 4, 1873.

"If any merchant were asked whether it were a good or necessary thing not only to take an account of stock annually, but to have the best possible acquaintance with the nature and history of the goods in his warehouses, we should expect but one answer. But when it is asked whether it is desirable to know the stores and forces and nature and history of all the contents of God's universe, there are people who are alarmed, as if possibly we might know too much, or get too near the sources of things. What a blasphemous discovery vaccination was pronounced at first; how it seemed to many a flying in the face of Providence to use the electric telegraph! I have heard of a learned and skillful physician, whose daughter was born with a club-foot, and who would not allow the use of the nearly perfect mechanical appliances which would have reduced the congenital misfortune to its lowest terms, because it was questioning the wisdom of a Being who had sent this child into the world with this malformation. Many, from similar superstitious scruples, refuse the alleviation of anæsthetics. Can there be a more perverse form of reverence than that which supposes that God is a sort of divine conjuror, who does not allow any peeping behind the curtain where he prepares his tricks? Can we, by possibility, circumvent the power that made us, find out any secrets we ought not to know, come to know too much, and so endanger any real hopes and promises in the region of morals and faith?

"If Nature or Providence or, far better, God, were a cheap and economical architect, who had built his universe by contract and put the best work outside, there might be need for caution in exploring the strength of the walls, the way of the flues, the texture of the girders. But heaven is not a mansard roof, liable to go off in smoke, and man and nature are not veneers, but good solid stuff that will bear examination. If there is anything fictitious and imaginary which advancing knowledge and science may cause to pass away, like the baseless fabric of a vision, by all means turn on the light, gentlemen. If this universe is only a better sort of theatre, whose shows and manikins are enjoyable only when viewed in a dim religious light, supplied by tallow or gas, pray take off the roof and let the sham stand out in the blaze of day and we will acknowledge ourselves on a par with Punch and Judy—puppets amused with puppets. But if the universe is the glorious, sublime, mysterious, and perfect counterpart of its Infinite Builder and inhabiter—which we suppose to be the case—we object to the plan for conducting any investigation into its nature, texture, laws, origins, with closed doors or under religious protest. It were cowardly and unbelieving to think that science knows or can learn or tell anything unworthy of the author of a nature so glorious as the universe we behold or the soul we possess; and practically it is not science that has injured any of the genuine poetic, religious, or moral interests of humanity, but only its conceits and puerilities. All the prejudices, superstitions and erroneous usages of the world shriek fearfully when they are wounded and dying. Suppose you should be able scientifically to prove that burning was a safer, better way of disposing of the bodies of the dead than burial in vast poison-breathing cemeteries on the borders of crowded cities, do you suppose that speculative lot-owners, the undertakers, and the florists, would not assail you as heathen, atheists, blasphemers, the basest of your species, and unworthy the name of man? Well, the hue and cry would be uncomfortable, but the clamor would not make it so; and when your science had diminished the death-rate and defeated the approaches of pestilence and extinguished the whole race of tyrannical undertakers, whom I hesitate to name at all, such is the awe they have inspired me with, the people would turn round and order a golden urn for your ashes after you had become deaf to its praise.

"Services of science to humanity! I should like to know what steps forward humanity ever takes ungoaded, unled, unenlightened by science! She is the chief marshal of the army of progress and the great antagonist of ignorance, superstition, injustice, falsehood, and humbug. Those who suspect, deny, oppose, and hinder her inquiries, are feed and paid accomplices of ignorance and super-

stition, or victims of both. But let science be real; let her priests and prophets be of circumcised lips! What business have they with arrogance, mock certainty, precipitate conclusions, or money-making accommodations?

"Do not suppose, ye men of science, that religion fears anything you can do, in the legitimate use of your functions and the freest use of your methods, to unsettle her foundations. They are not at your mercy! If faith in the person of its professional advocates and exponents has been often unjust to you, you have paid her off with interest. Nay, in these days she is more just to science than science is to faith, and I take leave to say that, when it comes to breadth and comprehensiveness, the teachers of religion (ignorance is always narrow in your domain and ours), the teachers of religion in their representative and first men in all schools, are more just to your studies and discoveries than your first men are to hers. If the trial must be made, we shall be found better able to swallow you than you us! But let it be confessed we need your aid, though not more than you do ours."—*Address of the Rev. Dr. Bellows, Feb. 4th,* 1873.[1]

"No amount of book-learning will make a man a scientific man; nothing but patient observation, and quiet and fair thought over what he has observed. He must go out for himself, see for himself, compare and judge for himself, in the field, in the quarry, the cutting. He must study rocks, ores, fossils, in the nearest museum; and thus store his head, not with words, but with facts. He must verify—as far as he can—what he reads in books, by his own observation; and be slow to believe anything, even on the highest scientific authority, till he has either seen it, or something like enough of it to make it seem to him probable, or at least possible. [Where can a young Pennsylvanian or Philadelphian find 'the nearest museum' where he may study rocks, ores, fossils, minerals? The vast collections of the Academy of Natural Sciences of Philadelphia are very imperfectly available for this purpose now, because there is not sufficient space in the building in which they are for their proper display.]

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"And as for harmless amusement, and still more for the free exercise of the fancy and the imagination, I know few studies to compare with Natural History; with the search for the most beautiful and curious productions of nature amid her loveliest scenery, and in her freshest atmosphere. I have known again and again working men who in the midst of smoky cities have kept their bodies, their minds, and their hearts healthy and pure by going

[1] Proceedings at the farewell banquet to Professor Tyndall, given at Delmonico's, New York, Feb. 4th, 1873. New York, D. Appleton & Co., 549 and 551 Broadway, 1873.

out into the country at all hours, and making collections of fossils, plants, insects, birds, or some other objects of natural history; and I doubt not such will be the case with some of my readers.

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"The civilized world is learning, thank God, more and more of the importance of physical science; year by year, thank God, it is learning to live more and more according to those laws of physical science, which are, as the great Lord Bacon said of old, none other than '*Vox Dei in rebus revelata*'—the word of God revealed in facts; and it is gaining, by so doing, year by year, more and more of health and wealth; of peaceful and comfortable, even of graceful and elevating, means of life for fresh millions.

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"Suppose that any one of you, learning a little sound natural history, should abide here in Britain to your life's end, and observe nothing but the hedge-row plants: he would find there is much more to be seen in those mere hedge-row plants than he fancies now. The microscope will reveal to him in the tissues of any wood, of any seed, wonders which will first amuse him, then puzzle him, and at last (I hope) awe him as he perceives that smallness of size interferes in no way with perfection of development, and that 'nature,' as has been well said, 'is greatest in that which is least.' And more. Suppose that he went further still. Suppose that he extended his researches somewhat to those minuter vegetable forms, the mosses, fungi, lichens; suppose that he went a little further still and tried what the microscope would show him in any stagnant pool, whether fresh water or salt, of Desmidæ, Diatoms, and all those wondrous atomies which seem as yet to defy our classification into plants or animals. Suppose he learnt something of this, but nothing of aught else. Would he have gained no solid wisdom? He would be a stupider man than I have a right to believe any of my readers to be, if he had not gained thereby somewhat of the most valuable of treasures, namely, that inductive habit of mind; that power of judging fairly of facts, without which no good or lasting work will be done, whether in physical science, in social science, in politics, in philosophy, in philology, or in history.

"But more let me urge you to study natural science, on grounds which may be to you new and unexpected—on social, I had almost said on political, grounds.

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"And I tell you, if you, or I, or any man, want to let our thoughts play freely round questions, and so escape from the tendency to become bigoted and narrow-minded which there is in every human being, then we must acquire something of that inductive habit of mind which the study of natural science gives.

It is, after all, as Professor Huxley says, only common sense well regulated. But then it is well regulated; and how precious it is, if you can but get it. The art of seeing, the art of knowing what you see; the art of comparing, of perceiving true likenesses and true differences, and so of classifying what you see; the art of connecting facts together in your own mind in chains of cause and effect, and that accurately, patiently, calmly, without prejudice, vanity, or temper—this is what is wanted for true freedom of mind. But accuracy, patience, freedom from prejudice, carelessness for all except the truth, whatever the truth may be—are not these the virtues of a truly free spirit? Then, as I said just now, I know no study so able to give that free habit of mind as the study of natural science.

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"Do you wish to be great? Then be great with true greatness; which is,—knowing the facts of nature, and being able to use them. Do you wish to be strong? Then be strong with true strength; which is,—knowing the facts of nature, and being able to use them. Do you wish to be wise? Then be wise with true wisdom; which is,—knowing the facts of nature, and being able to use them. Do you wish to be free? Then be free with true freedom; which is—knowing the facts of nature, and being able to use them.

* * * * * * * *

"But now: why should I, as a clergyman, interest myself specially in the spread of natural science? Am I not going out of my proper sphere to meddle with secular matters? Am I not indeed, going into a sphere out of which I had better keep myself, and all over whom I have influence? For is not science antagonistic to religion? and, if so, what has a clergyman to do, save to warn the young against it, instead of attracting them toward it?

"First, as to meddling with secular matter. I grudge that epithet of secular to any matter whatsoever. But I do more; I deny it to anything which God has made, even to the tiniest of insects, the most insignificant atom of dust. To those who believe in God and try to see all things in God, the most minute natural phenomenon cannot be secular. It must be divine; I say, deliberately, divine; and I can use no less lofty word. The grain of dust is a thought of God; God's power made it; God's wisdom gave it whatsoever properties or qualities it may possess. God's providence has put it in the place where it is now, and has ordained that it should be in that place at that moment, by a train of causes and effects which reaches back to the very creation of the universe. The grain of dust can no more go from God's presence, or flee from God's spirit than you or I can. If it go up to the physical heaven, and float (as it actually often does) far above the clouds, in those higher strata of the atmosphere which aeronaut has never

visited, whither the alpine snow-peaks do not rise, even there it will be obeying the physical laws, which we term hastily laws of nature, but which are really the laws of God: and if it go down into the physical abyss; if it be buried fathoms, miles below the surface, and become an atom of some rock still in the process of consolidation, has it escaped from God, even in the bowels of the earth? Is it not there still obeying physical laws, of pressure, heat, crystallization, and so forth, which are laws of God—the will and mind of God, concerning particles of matter? Only look at all created things in this light—look at them as what they are, the expressions of God's mind and will concerning this universe in which we live—'the Word of God,' as Bacon says 'revealed in facts'—and then you will not fear physical science; for you will be sure that the more you know of physical science, the more you will know of the works and of the will of God. At least, you will be in harmony with the teaching of the Psalmist. 'The heavens,' says he, 'declare the glory of God; and the firmament showeth his handiwork. There is neither speech nor language where their voices are not heard among them.' So held the Psalmist concerning astronomy, the knowledge of the heavenly bodies; and what he says of sun and stars is true likewise of the flowers around our feet, of which the greatest Christian poet of modern times has said:

> 'To me the meanest flower that grows may give
> Thoughts that do lie too deep for tears.'"

—*Rev. Charles Kingsley, F. L. S., F. G. S., Canon of Chester.*[1]

"It is, of course, an obvious corollary to my proposition [the 'total abandonment of Greek and Latin verse-writing as a *necessary* or *general* element in a liberal education'] that the hours now devoted to 'composition' should be assigned to other studies of the highest value, which have hitherto been very partially recognized or very openly ignored. Among these studies are Comparative Philology, History, Modern Languages, the Hebrew Language, and the language and literature of our own country; but foremost in the weight of its claims is the study of Science—a study so invaluable as a means of intellectual training, and so infinitely important in the results at which it arrives, that the long neglect and strange suspicion with which it has hitherto been treated can only be regarded as a fatal error and a national misfortune."—*Rev. F. W. Farrar, M. A., F. R. S.*

"But there is another and even a stronger ground for advocating the introduction of science as an element of all liberal education, and that is, its peculiar merit as a means of educating the mind. Science is not only knowledge, but it is also power. The

[1] Town Geology.

mind is not only an instrument of advancing science, but, what is more to our present point, science is an instrument for advancing the mind. * * * * Mill speaks of the 'indispensable necessity of scientific instruction, for it is recommended by every consideration which pleads for any high order of intellectual education at all.' Science is the best teacher of accurate, acute and exhaustive observation of what is; it encourages the habit of mind which will rest on nothing but what is true. Truth is the ultimate and only object, and there is the ever recurring appeal to facts as the test of truth. And it is an excellent exercise of memory; not the verbal, formal memory, but the orderly, intelligent, connected, accurate storing up of knowledge. And of all processes of reasoning, it stands alone as the exhaustive illustration. It is prëeminently the study that illustrates the art of thinking. 'The processes by which truth is attained,' to quote again from Mill, 'reasoning and observation, have been carried to their highest known perfection in the physical sciences.' In fact, the investigations and reasonings of science, advancing, as it does, from the study of simple phenomena to the analysis of complicated actions, form a model of precisely the kind of mental work which is the business of every man, from his cradle to his grave; and reasoning, like other arts, is best learned by practice and familiarity with the highest models. Science teaches what the power and what the weakness of the senses is; what evidence is, and what proof is. There is no characteristic of an educated man so marked as his power of judging of evidence and proof. The precautions that are taken against misinterpretation of what is called the evidence of the senses, and against wrong reasoning, and tracing the thoughts backward down to the ground of belief; the constant verification of theories; the candid suspension of judgment where evidence is still wanting; that wedding of induction and deduction into a happy unity and completeness of proof, the mixture of observation and ratiocination, are precisely the mental processes which all men have to go through somehow or other in their daily business, and which every intelligent being who is capable of forming an intelligent opinion on the subject sees would be better done if men had familiarized themselves with the models of these processes which are furnished by science. I do not mean that a boy knows he is doing all these things; but he *is* doing them visibly. And when he applies the analysis of logic to the processes of his mind, he will find that he has been thinking logically, though unconsciously so."[1] —*J. M. Wilson, M. A. F. G. S. F. R. A. S.*

[1] On Teaching Natural Science in Schools. Essays on a Liberal Education. Edited by Rev. F. W. Farrar, M. A. F. R. S. Assistant Master at Harrow etc, etc., etc. MacMullen & Co., London, 1867.

Are not all these witnesses competent? They are sagacious, intelligent, sincere, benevolent men, and, in every sense, worthy of credence. Their testimony at least tends to show that the study of all those departments of human knowledge which are called natural sciences ought to be encouraged in every civilized community:—That they ought to be included to a greater or less extent in every scheme of liberal education:—That original research, that is, efforts to add to the sum of existing knowledge whatever is yet unknown and within the limited capacity of man to ascertain and demonstrate, is of primary importance to the progress of civilization and for such reason ought to be fostered:—That the study of, and original research in the natural sciences are not antagonistic to Christianity and the spread of absolute truth.

Now, what is the duty to society of those who do not question the soundness of these conclusions? Is it not to help, in some degree at least, if not to the full extent of their ability, institutions already established for the purpose of acquiring and diffusing knowledge of the natural sciences among the people; and to establish one in every considerable population where no such institution exists?

Those who seek knowledge of the works of the Creator need, in order to pursue their labors profitably, materials and implements of a kind and in number beyond the power of individual wealth to acquire. They are obtainable only in cities or large towns, and in them only through a kind of cooperative system, on condition of right to their common use when obtained. The materials alluded to consist of large collections of specimens of natural objects already known, in other words, an extensive museum in which all objects are distinctly labelled, and arranged properly for convenient reference by the students of any and every department, botany, zoology, mineralogy, geology, palæontology, ethnology. The implements of study, besides a full library of works on natural science, includes a chemical apparatus and laboratory, microscopes, etc., and last though not least, a suitable edifice to contain the whole. With such facilities the student of nature may prepare himself and take the preliminary steps necessary for original research.

The diffusion of knowledge thus acquired is effected through

the agency of the press and the lecture-room and qualified lecturers, and also by frequent visits to the museum.

The requirement of such various and extensive means of study grows out of the recognized affiliation and interdependence of all branches of science. For instance: Sir Charles Lyell tells us truly that "Geology is the science which investigates the successive changes that have taken place in the organic and inorganic kingdoms of nature; it enquires into the causes of these changes, and the influence which they have exerted in modifying the surface and external structure of our planet." Consideration of this definition will show that to properly investigate the successive changes that have taken place in the organic kingdoms of nature since the creation of the world requires acquaintance with the existing botany and zoology; and to recognize the changes in the inorganic king doms leads to the study of the structure and composition of minerals and rocks; and inquiry into the causes of such changes demands consideration of the movements of the atmosphere, of the waters of oceans, lakes and rivers, of glaciers as well as of volcanic phenomena. Without a general knowledge of chemistry and of the laws of the natural forces, heat, light, electricity, gravitation, the geological investigator is not properly equipped for efficient work.

This point may be further illustrated. Many departments of science contribute jointly to the results of a geological survey, undertaken to ascertain the natural resources and capabilities of a country. The "Sixth Annual Report of the United States Geological Survey of the Territories," by F. V. Hayden, United States Geologist, is an octavo volume of 844 pages. It contains maps, the data for which were obtained by the astronomer and topographer who determine the position and extent of lakes, the course of rivers, the heights of mountains, etc. An artist and photographer supplies sketches of stratifications, views of mountains, geysers, waterfalls, and remarkable scenery. Observations of atmospheric phenomena, to ascertain and show the character of climate, are made and recorded by a meteorologist. In the departments of mineralogy and lithology, there are descriptions and catalogues of minerals and rocks; in geology, accounts of the structure of mountains, the relations of formations and strata,

and the character of the general surface of the country; in chemistry, analyses of spring waters, minerals, coals and ores; in botany, lists of plants; in mammalogy, accounts and list of mammals; in ornithology, of birds; in itchyology, of fishes; in herpetology, of reptiles; in entomology, of insects; in conchology, of mollusks and shells; in palæontology, descriptions and catalogues of the fossil remains of plants, mollusks, mammals, reptiles, fishes; in ethnology, descriptions of aboriginal mounds and stone implements. The new species described are two minerals, three plants and ten insects, worms and arachnidans; and of new fossil species, sixty-seven plants, fifty-one invertibrates, nineteen reptiles, and several very remarkable mammals. This summary of the contents of this report indicates the variety and general character of the scientific knowledge requisite in making a thorough geological survey.

To recognize what is new among natural objects requires previous acquaintance with what has already been described, or with the methods of determining whether a plant or animal supposed to be new is so, by comparing it with those which it resembles most in its characteristics. Familiarity with comparative osteology and anatomical homologies enables the palæontologist to construct an entire animal from a single fossil tooth or bone, and determine whether it has been described previously. But, to accomplish such work the expert must have means of comparison such as a full museum and a well-furnished library afford.

Every government includes a fair representation of the nation's intelligence and wisdom. Therefore, as every great city of Europe has a scientific museum, founded and maintained at public expense, it may be reasonably inferred that such institutions are useful to the people and necessary to scientific progress.

The Garden of Plants, Dr. Pouchet declares, is undoubtedly the most popular institution, not only in Paris but in the whole world, and is the first point visited by every stranger who sets foot in the French capital. This popularity is due, in his opinion, less to its rich collections than to the renown won in the institution by the Buffons, the Tourneforts, the Cuviers, the Lamarcks, the Geoffrey Saint-Hilaires and others who have labored, become learned and made discoveries in it.

The vast scientific and art collections of the British Museum,

are known to every European tourist. Not long since it was determined to remove from it all those collections which pertain to the natural sciences, and place them in a building in South Kensington. Parliament voted £6,000 to defray the expense of clearing the ground. The part of the edifice now under contract presents a façade of 675 feet, and wings of 250 feet.[1] This structure will contain only such specimens as those displayed in the several museums of the Garden of Plants.

After an experience of a hundred years, a young nation invites the world to examine the visible, objective evidence which it has to offer that the system of government which it adopted at the outset is, in spite of defects, better than any other hitherto devised, to render all men equally free to seek and enjoy worldly happiness, limited in degree only by the force of natural intellect and the extent of its cultivation and training. The belief, common to all true Americans is that national progress in every direction within our boundaries is sufficient to satisfy the people and even statesmen and politicians of all nations that this experiment in human government is successful. Everywhere there is testimony to this effect. Every locality of the inhabited regions of our widespread land has proof to offer in this connection. But no where will such proofs be more closely scanned by our visitors during the centennial anniversary than in this commonwealth and city.

It is stated that in the year 1775 the population of the State of Pennsylvania was 275,000; now it is 3,521,951. The population of Philadelphia did not exceed 40,000; in 1876, it will probably exceed 700,000. The census of 1790 makes the population of the nation 3,920,214; and that of 1870, an aggregate of 38,558,671. Has population under any form of government increased at a more rapid rate than this?

According to the census of 1870, Philadelphia contained 112,366 dwellings, 8,184 manufacturing establishments, using the motive power of fifty-nine water wheels and 1,611 steam engines, or an aggregate of 42,224 horse power, and employing 137,496 hands, which together produced manufactures worth $322,004,517 in a year.

It contains 424 church edifices, 25 hospitals, 6 dispensaries,

[1] The Builder—London, Jan. 4th and 11th, 1873.

24 benevolent societies and 58 charitable institutions of different kinds, established and maintained by spontaneous contributions of the citizens.

The public treasury maintains 31 consolidated, 192 primary, 111 secondary, 60 grammar and 2 high schools, in which 84,387 pupils are taught by 1,630 male and female teachers, in 396 public schools. The city contains also, beside numerous private schools and academies, a polytechnic college, two medical colleges and a university.

There is also a school of design, an Academy of Fine Arts, for the use of which many liberal citizens have generously contributed a fund to construct a new and elegant building which is well advanced; an academy of music and eight or nine theatres.

These institutions afford ample proof that religion, charity, benevolence, industry, primary and general education, and the fine arts are cherished, and that our wealthy citizens are intelligently generous in providing for the common wants of this city, which, classed according to the number of its inhabitants, is the twelfth city of the world, and the second in the United States.

Among the evidences of progress in science and civilization made in this city during the hundred years of the nation's existence, to be exhibited to our visitors in 1876, a museum worthy the name and pride of the city should not be overlooked. Packed in an old and unsightly and inconvenient building at the corner of Sansom and Broad streets, the Academy of Natural Sciences of Philadelphia has the materials—more than 400,000 specimens—for a museum, which in many respects would compare favorably with the foremost of the kind in Europe, provided that they be arranged properly in an edifice of sufficient capacity for their exhibition.

Want of space in the old "hall," as it is called, has been noticed and felt during many years. It had become so pressing that in 1866 an appeal was made to the members of the society and to the public for means to supply this want. Subscriptions were liberally made by about 350 persons to an aggregate of $108,000. Of this amount $94,139 in sums of from $10 and less to $2,156, had been paid up to January 1871. The disbursement of this building fund was confided to a Board of Trustees, thirteen mem-

bers of the Academy, who are annually elected by the contributors to the fund.

After careful consideration of the question of locality, a lot was selected and purchased. It is opposite Logan Square, and is in every respect an eligible site. A plan of fire proof building has been adopted, which is to be realized in the collegiate gothic style of architecture, with exterior walls faced with green serpentine and the openings trimmed with Ohio sandstone.

The plan of the entire building includes space for the scientific library of say 23,000 volumes; general cabinets of minerals, rocks, fossils; dried plants, corals, marine and land shells, insects, reptiles, fishes, birds, mammals; comparative anatomy, mummies and ethnological specimens, all to be labelled and arranged for satisfactory examination. Apartments for the use of male and female artists engaged in portraying natural objects, a reading-room in which will be found all the scientific periodicals of the world; work-shops and committee or study rooms. It is proposed that the centre building be appropriated to a display of specimens of the natural wealth of Pennsylvania exclusively, in which may be seen every plant, mineral, ore, and rock and every animal belonging to the natural history of the commonwealth. The southern wing with an area of say 120 feet by 60 feet, will contain a public lecture room and a laboratory, for which the society has, now boxed, some 1500 pieces of apparatus. It is desired that this laboratory may be so endowed that any properly qualified person engaged in original research may pursue his investigations in it, without any other cost to him than that of materials he may consume, and the repair of apparatus he may damage in his work.

A fuller description of the proposed building has been published.*

The north wing of the new building has been commenced. The beams of the second or museum floor will be laid this season. With the execution of this much of the plan the treasury of the building-fund will be nearly exhausted. Unless the subscriptions already made be promptly paid, and subscriptions in addition to the amount of say $50,000, the work cannot be continued and enclosed with the roof next year.

* An address. The claims of the Academy of Natural Sciences of Philadelphia to Public Favor. By W. S. W. Ruschenberger. Philada. 1871.

The sum needed to construct a fire-proof building 186 feet long by 66 feet wide, two stories high, with interior galleries, is very considerable where the cost of labor and materials is as great as it is in this city. The estimate is $187,000, but it is notorious that builders' estimates fall short of reality. A provision of $200,000 will probably be found not more than enough for the purpose. But for an edifice designed to be of indefinite duration is insignificant in comparison with sums expended for temporary structures erected to exhibit manufactures and works of art. The building for the exposition in London, 1851, cost $850,000; that of 1862, $2,298,185; that of Paris, in 1855, $3,373,300; of 1867, $2,356,605, and that of Vienna, in 1873, $7,850,000.[1] The erection of the same structures in Philadelphia, at this time, would cost at least one-third more, or for the last, say $10,500,000, an immense expenditure for six months' service.

A half-million of dollars might be most profitably spent in the erection of a fire-proof building to be of indefinite duration, "not for a day, but for all time," to afford proper accommodations for original scientific research, for the study of the natural sciences and the diffusion of knowledge of them by means of lectures, and for a great museum for public use. Where so much is spent for church spires and other architectural decorations, in a great centre of manufacturers of every name, to whom original scientific research is of inestimable value, such a sum ought to be raised without great difficulty, provided that the daily press, to which the Academy is already under lasting obligations, were to make all readers see the importance of this enterprise as plainly as they see worn-out pavements or tattered garments.

Is there any hope that the State of Pennsylvania may assist this institution? Other States have given substantial aid to similar establishments. Massachusetts has given $265,000 to the Museum of Comparative Zoology, a department of Harvard University. New York has expended $600,000 on the State museum at Albany, and given $500,000 toward a museum of natural history in Central Park, N. Y.

[1] Final Report to the U. S. Centennial Commission on the structures erected for the Vienna Universal Exhibition, 1873, and previous exhibitions in London and Paris. By Henry Pettit, Civil Engineer, Special Agent United States Centennial Commission. Philadelphia, September, 1873.

"I have never yet had the good fortune to hear any valid reason alleged why that corporation of individuals we call the State may not do what voluntary effort fails in doing, either from want of intelligence or lack of will. And here it cannot be alleged that the action of the State is always hurtful. On the contrary, in every country in Europe, universities, private libraries, picture galleries, museums and laboratories have been established by the State, and have done infinite service to the intellectual and moral progress and the refinement of mankind.

"A few days ago I received from one of the most eminent members of the Institute of France a pamphlet, entitled 'Pourquoi. la France n'a pas trouvé d'hommes superieurs au moment du péril.' The writer, M. Pasteur, has no doubt that the cause of the astounding collapse of his countrymen is to be sought in the miserable neglect of the higher branches of culture, which has been one of the many disgraces of the Second Empire, if not of its predecessors."[1]

The many educational, charitable, religious and eleemosynary institutions of the city have claims worthy of the generosity and charity of our benevolent fellow-citizens; but no one of them is in itself more important to the common good, or more in need at this time of fostering care and aid, than the Academy of Natural Sciences of Philadelphia. In its behalf I earnestly ask that its condition may be fairly considered, and that every citizen approving of our enterprise will contribute such sum as may be consistent with his dignity and circumstances to give.

W. S. W. RUSCHENBERGER.

THE CONQUEST OF SPAIN BY THE ARAB-MOORS.

XV.—STATISTICS OF THE REMAINING HISTORY.

WITH the firm establishment of Abdu-r-rahman Addakhel on the throne of Cordova, the conquest of Spain was completed and assured. The rapid occupancy of the territory by the armies of Musa and Tarik had been the furious surge of a tidal wave, which might have had a retrogression. The administration of the early Ameers made Spain the appanage of the Khalifate,

[1] Administrative Nihilism. By Thomas Henry Huxley, LL. D., F. R. S.

liable to be strengthened or weakened by numerous causes, such as the condition of the Eastern throne, the claims and counter-claims of the invading tribes, and the quarrels of factions, headed by ambitious adventurers. But when the allegiance to the Khalif was thrown off, and the Ommyan prince declared himself *Al Mumenin*, a new and supreme commander of the faithful, these troubles disappeared, a new national loyalty was created; the conquest was complete.

I am thus particular because I desire to show, that in bringing the narrative down to this period, I have kept faith with the reader, and have given him the entire story. It would be indeed of great interest to pursue the history, and to show how grand causes were at work to undermine and destroy the Moslem power, but this is no part of my task, and is further precluded by the limits of our space.

There are however certain important corollaries which have sprung from the main proposition, without which this would be but an abrupt and too literal termination. The conquest thus far seems to be one chiefly of physical force, but the questions arise what did they achieve for civilization? what were they as a nation in their new home? what influence did they exert upon the history of Europe? To these questions the two remaining papers must be devoted, and I can only regret that my time and space will permit but inadequate answers. Before doing so, however, I present to the reader an almost tabular summary of their later dominion, in order that he may have the principal vicissitudes of their historic life, and the chronology of its principal features.

The dynasties, or distinct governmental systems of the Arab-Moors during their eight centuries of residence, are conveniently divided into four.:

1. From 711 to 756, or that under the Ameers of the khalifs, from Musa and Tarik, to Abdu-r-rahman I.

2. From 756 to 1036, during the independent khalifate (seventeen khalifs), of the house of the Ommyades.

3. From 1036 to 1235, when the khalifate was divided into petty kingdoms, and attempts at union were made by the African incursions of the Almoravides and Almohades.

4. From 1238 to 1492. During this time the dominion of the Saracens had dwindled down to the tributary kingdom of Granada,

which was overthrown in the year last mentioned by Ferdinand and Isabella.

The following table, extracted from the work of Gayangos, will present the reigns of the khalifs of the house of Ummeyah :

I.	Abdu-r-rahman I., from 756	to	788
II.	Hisham I.,	to	796
III.	Al-hakem I.,	to	822
IV.	Abdu-r-rahman II.,	to	852
V.	Mohammed I.,	to	886
VI.	Al-mundhir,	to	888
VII.	Abdullah,	to	912
VIII.	Abdu-r-rahmen III.,	to	961
IX.	Al-hakem II.,	to	976
X.	Hisham II.,	to March,	1009
XI.	Mohammed,	to Nov.	1009
XII.	Suleyman,	to June,	1010
	Mohammed II., 2d time,	to Aug.	1010
	Hisham II., "	to	1013
	Suleyman, "	to	1016
XIII.	Abdu-r-rahman IV.,	to	1019
XIV.	Abdu-r-rahman V.,	to	1023
XV.	Mohammed III.,	to	1025
XVI.	Hisham III.,	to	1031

This line which began its dominion with such vigor and splendor became degenerate in the lapse of time. It ended with Hisham III. The establishment of the tribes in various localities had given them strength, and we see the reverse action to that which took place at the north; there feudalism gave place to monarchy; in Spain the monarchy was subjected to a feudality which deposited the power in the hands of prominent families settled in the large cities and their *comarcas*, and thus the empire fell to pieces.

The quarrels and factions of these families were fostered by the increasing power of the Christians and the effeminacy of the khalifs. The *fasces* firmly bound had been strong: the bonds were loosed and the tumbling elements were weak and an easy prey to the Christian hosts, who were aided by the internecine quarrels of the Moors.

Thus the Beni Hammud, which had maintained the power in Cordova until 1030, were overpowered by the Beni Jehwar, who sustained themselves until 1058.

So too the Beni Idris ruled in Malaga until 1055, and in Algesiras until 1058. The Zeyrites held sway in Granada until 1090, and the Beni Abbád in Seville until 1091. The power of the Beni Dhi-n-nún was assured in Toledo until 1085.

The complete lists of the petty kingdoms may be found in the second volume of Al makkari; this indication of their existence is all that need be given in this sketch. All that is necessary here is to observe that the Mohammedan empire had fallen to pieces; the cities had become kingdoms; the Christian kings were marching down to swallow them one by one, and nothing stayed their hand but a temporary counter-conquest by African tribes. New hosts from Mauritania marched into Spain, usurped the Moslem power, and while they trampled upon the Moorish rights, stayed the progress of the banner of the Cross.

The old story was repeated. In Africa a new dominion had sprung up under Yusuf Ibn Tashefui; they were called the Almoravides. The principle men of this association were the chiefs of a noble Arabian tribe which had been banished from their home. The philosophy of their rise is manifest; with the consolidation of power at the seat of the Eastern khalifate on the one hand, and with a like consolidation in Spain on the other, Africa became a separate ground for new men and new schemes of ambition. Thus about the year 1000, the Almoravides had grown into power, under a gifted chief who gave them their name, *Almoravides, devoted to God.* With them Yusuf usurped the power and took the title of supreme Khalif.

Of their coming into Spain there are several accounts; the truest is that Mohammed III. in his emergency applied to them for assistance against Alfonso. They crossed the strait, gave the desired aid, and instead of returning usurped the power. It was an apparent reconstruction of the Saracenic empire; but dissolution was in the very air, and the instruments were at hand.

Upon the departure of the Almoravides for Spain, Africa was left in disorder and tumult. Again the chance appeared for other men and new schemes; men and schemes which were to originate there in the existing condition, and at once to act upon suffering, dissevered, declining Spain. A heretical lamplighter sprung up as the leader of this new faction, and united in his plot a *mehedi*, or doctor of canon laws. From this fact came the name al Mehedes, corrupted into Almehedes,[1] or Almohades.

[1] The Arabic word is *m-h-di*, and the supply of the vowels is in many cases very arbitrary.

As soon as they had became strong in Africa they crossed the narrow sea in large force, conquered where they could, and established themselves, and incited insurrection everywhere. The unhappy people of Spain, dazed by their misfortunes, looked in every direction for succor, and for a moment hoped they might find protection from their new comers; but their hopes were vain. The Almohades drove the Almoravides before them, captured Granada and expelled their predecessors into the Balearic isles. They put down the petty kings; they united for a brief space with the Christians, to establish their power. Large reinforcements joined them from Africa, and for a time it seemed that a strong and lasting dominion had been established. Not content with routing the Almoravides from Spanish territory, they followed them to the Balearic islands, and in 1199 subverted their power there. But notwithstanding all these successes their day was soon to come. The Christian forces united against them, and in 1230 their dominion was destroyed. Once again there was a return to the petty kingdoms, weak, hopeless, with no sagacity to seek that union in which alone was strength.

In 1238, Ibnu-l'ahmar retreated from Jaen to Granada, and in that favored nook he and his successors retrieved for a time the evil fortunes and shattered reputation of the Arab-Moors. It was their last stronghold, and it became, in art, science and manufactures, the glory of the declining dominion. Then arose the fairy courts of the Alhambra, and the garden-like perfection of the Vega. Granada, too weak to cope with the advancing Spaniards, sought leisure and rest by becoming a tributary kingdom. Its monarchs were the vassals of the Christian kings of Spain. They purchased immunity by following their masters to war against their own recalcitrant people; their luxury was purchased by a golden servitude.

And here we reach the very romance of the history, so brilliantly illustrated by Irving and Prescott. The end which was a foregone conclusion, might yet have been long delayed, had not parties and factions sprung up in the little state. Again tribes were arrayed against each other and against the king. The doubtful story of the Zegris and the Abencerrages is full of meaning. Restive under tribute to the Christians, they turned their arms against each other, and gave their enemies more than pretexts—a necessity, so to

speak—to make a conclusion of the whole matter. Monarchs were deposed and restored, rebellions were constant, and when at length Ferdinand and Isabella marched into the Vega, it required more than a Cæsar or a Charlemagne to withstand the vigorous onset of troops whose battle-cry for centuries had been death and destruction to the Moorish infidels.

Abu Abdillah[1] the last of the Moors, has received hard judgment from history. *La cuesta de las lagrimas* and *el ultimo sospiro* have been considered tokens of his weakness. The epigrammatic speech of his mother, Zoraya, that "he wept like a woman for what he should have defended like a man," has stamped Boabdil el chico,—El Zogoybi (the unlucky), as the enervate king who might, with proper valor and vigor, have driven back the monarchs of Castile and Aragon, and transmitted the "garden of Andalusia" to a long line of successors. This is all wrong; it was not in the power of man.

Slowly, step by step the Christians, who from the very date of the conquest had fled into the Asturias, there made a feeble stand, then routed those who came to destroy them, then marched southward, conquered province after province, gathering strength with their progress; then, upon the overthrow of the Khalifate, they took kingdom after kingdom. African usurpers fared no better at their hands; the momentum increased until it was written in the book of Arabian fate that the Moorish dominion must end.

From these brief condensed statistics, we turn to consider their social systems, and their intellectual culture; the former have largely influenced all the later Spanish history; the latter has laid Europe and the world under a lasting obligation.

XVI.—GLIMPSES OF THE SOCIAL SYSTEM.

Having thus given, in brief statistics, an outline of the Spanish-Moorish history from the establishment of the independent khalifate under Abdu-r-ráhman the first, to the expulsion of Boabdil El chico from their last resting-place in Granada, we are now ready to inquire into the civilization which they induced or achieved during their occupancy of nearly eight centuries. What progress did they make intellectually? What developments in

[1] Contracted unto Boabdil.

art? What were their conditions of government? What their social customs and institutions and their domestic habits? These questions involve that philosophy which alone gives value to history, and these questions, if fully answered, would throw a strong light upon Spanish annals, and clear away mists that have hung over them thick and malarious from their day to our own.

I can only indicate, in a synoptical view, the general nature of these topics, leaving their fuller investigation to the interested student. No subject excels them in interest. Before accosting the general topic of the civilization of the Arab Moors in Spain, we must go back to the East and see what the early khalifs of Damascus and Bagdad were doing for human culture. We shall see that the beginnings of such a culture were at the courts of Damascus and Bagdad, and that the Spanish Arabs received both impetus and material from their Oriental brethren, who, in their turn, had received it from the countries they had conquered to the farther East.

But the Spanish Arabs were not the men to tie up the golden talent thus received in a napkin; they made it pay usury. That they were of the same race, language and creed, only made their emulation the stronger. They burned to make Cordova, Toledo and Seville more brilliant than the glorious seats of the Eastern khalifs. We shall see that they succeeded. The treasures of the East were garnered for Europe in the Spanish capitals. It has been seen that when the family of Al Abbas had usurped the throne of the Ommyades, they wisely sought a new locality in which they might centralize their power and render the line of the Abbasides illustrious. With a true Asiatic instinct they moved eastward into the midst of their most permanent conquests. Abu Jaafar Almansur, the successor of Abdullah, the shedder of blood, and the second khalif of that dynasty, fixed upon Bagdad, on the banks of the Tigris, in the year 763, and drew his materials for building a splendid metropolis from the ruins of Ctesiphon and Seleucia.[1] One of the mosques he built still remains, a relic of his project and its success. With this removal from Damascus came the beginnings of humane and secular culture. At least, very little had been accomplished before that. From the "Age

[1]Knight's English Encyclopœdia—Geography—*Bagdad.*

of Ignorance," which was also the age of superstition and idolatry, Mohammed had led the Arabians into an age of faith and of partial knowledge. The work of the Ommyades had been to give aim and system to this partial knowledge. The koran was to them both law and gospel: they make it their chief duty to assert its claims; they lived by it, governed by it, it was their incentive in war. Nothing beside was needed. And yet paradoxical as it appears, in arousing the Arabian mind, it led them to desire more.

The accession of the Abassides, bloody though it was, was to be a great stride in civilization. The popular longings for knowledge chimed with the ambition of the khalifs to be patrons of learning. The quick and receptive Arabian mind had been restrained in its ardor by narrow-minded rulers. The new dynasty saw at a glance that its greatest glory would be to lead in such a movement; and the change was so rapid that scarcely more than a century intervenes between the ruthless destruction of the Alexandrian library by Amru, and the eager cultivation by the Arabians of all branches of human knowledge. Extolling this great transformation, an Arabian writer tells us that the ink of the doctor soon took rank with the blood of the military martyr, and the learning of the wise was esteemed of equal value with the prayers of the good and the valor of the brave. The glory of the sword was to acknowledge the power of the pen.

The steps in this progress, although at first astonishing, are in reality simple and natural. Conquering generals were enjoined as the first duty after conquest, to build mosques, in which Allah might be adored and his prophet revered. Attached to every mosque a school was at once established in which the Koran was taught, but to learn to read and write gave the scholars a powerful instrument, which was not content to expend itself upon the Koran; it sought exercise in literature, science and art, with an an avidity that could not be restrained. Aspiring to create, the genius of the Arabs was equally desirous to collect existing treasures of thought.

Besides, as long as the seat of the khalifate was at Damascus, to conquer had been the ruling passion and the chief labor, and the diverging lines of victory had caused many to be only valiant soldiers who in more peaceful times would have become learned doctors. But at last, when the power of conquest slackened; when Spain had asserted and could maintain her Moslem independence;

when the nations of the farther east had bowed supinely before the victorious banners of Islam; when the greater part of the world had been conquered; when Bagdad had arisen in glory and beauty

> "After the fashion of the time,
> And humor of the golden prime,
> Of Good Haroun al Raschid,"

then men of all classes turned with enthusiasm to poetry, to history, to natural and experimental science, to all that was known or that they could hope to know of human learning,—a new world for a nobler conquest: and the Arabian mind was ready for this new and inviting career.

Almansur, the founder of Bagdad, stands in history as the usher of this new and beautiful order. Upon his accession to the khalifate in 754, among his first acts was to invite learned men to his court, without regard to nation or creed, and to treat them with eminent distinction. He then began assiduously to collect the existing treatises of the famous Greek writers, and caused them to be translated into Arabic. The famous medical treatises of the Greek physicians were thus brought into the Arabian schools in the skillful versions of George Backtischwah, and the art of healing among the Saracens, already practiced with enthusiasm, was based upon the surest foundations. An academy and a college of medicine were established; the study of clinics was made in hospitals which were attached to the college, and in laboratories, similarly provided, the best chemistry of the day,—principally iatro-chemistry—was successfully studied. At one time six thousand students of medicine and chemistry flocked to Bagdad.

Almansur was himself an apt scholar, and worked with the students in their investigations. His zeal for Islam became secondary to his enthusiasm for science.

The work which he nobly inaugurated moved under the impetus given by his hand, until it was seized with equal ardor and energy by his more distinguished grandson, Aaron the Just, known better, however, in all languages by his Arabic name, *Haroun Al Raschid.* This famous monarch was born in 765, only half a century after the first irruption of the Arab-Moors into Spain. It is he, who with his favorite wife, Zobeide, figures so largely in those marvelous stories of the thousand and one nights, called *The Arabian Nights' Entertainments;* stories which make the old young again,

and the learned child-like; stories which give to the illustrations rostrum, the sanctum and the household circle. There is a poetic justice in this romantic ensh rinement of Haroun, because he was really one of the grandest men of his epoch. He warmly espoused the cause of general culture, and his favorite ministers, of the powerful family o f the Barmecides, were first his ready agents and then his emulous rivals in capacity. They aided largely in making his reign illust rious. There was no field of culture too difficult or too modest for his support. Mathematics, and astronomy, jurisprudence, his tory, poetry, the natural sciences, all found favor, opportunity and reward.

It was his custom to take on his journeys, whether on a campaign or in a royal progress through his dominions, an hundred men of learning in his train, and they received the treatment of distinguished courtiers. He built mosques, of course, but his chief concern was to establish academies, and thus religion and science went hand in hand, or rather science outstripped religion. Nor was his fame confined, even in that day, to the East; he, perhaps more than any other sovereign, divided the admiration of Europe with his great western contemporary, Charlemagne, and astonished his imperial brother by the splendor of an embassy, and the richness of the gifts he sent. History may err in hyperbole: among his presents was an elephant, said to have been the first ever seen in France, and a linen tent of such exquisite texture that it could be folded into a very small compass, and yet, when pitched, it rose so high in air that an arrow shot by the strongest arm could not pass over its summit. "The interior of the tent was of the magnitude that few palaces could present a greater number of apartments."

The third valuable gift was indicative of the great progress which had been already made at the East in curious, complicated and delicate mechanism. It was a *clepsydra*, or water-clock of singular construction. It had twelve gates corresponding to the twelve hours. "When the hour was striking on the clock one of the gates opened itself, from which proceeded a regular number of small balls, and these, by falling in turn on a brazen vessel, marked the hour by the noise which they then caused; thus the eye perceived the hour by the number of opened gates, and the ear by the number of falling balls. At the twelfth hour twelve

small horsemen issued out of each of them through one gate, and closed them all in their course round the dial."[1]

But the character of Haroun is more strikingly presented to us by a gift more thoughtful and more magnanimous. Within his extensive dominions lay Palestine, a holy land to Jew, Saracen and Christian. Its central point, equally sacred to all, was Jerusalem, *urbs sancta* but peculiarly so to the Christians because it contained the sepulchre which had received the body of Christ.

It was well known to Haroun that the patriarch of Jerusalem had implored the protection of the great Charles for the churches of the East, and security for pilgrims to the sacred sepulchre. It is to the great honor of the Eastern khalif, that he sent unsolicited the keys of the Holy Sepulchre and of Calvary, and the standard of Jerusalem, to Charlemagne, and thus formally invested him with an uncontrolled authority in all matters concerning the security of the Christian Church and the monuments in the Holy City.

The character of Haroun is stained with acts of cruelty. It could hardly have been otherwise. The Mohammedan khalif had already become an oriental despot, and with autocratic power came the strong temptation to abuse it. He destroyed the Barmecides to whom he had owed so much; but despite his cruelty his name will always be renowned for the great progress of civilization made under his auspices, for the splendors of the court of Bagdad, and for his liberality to men of all creeds, and especially to the Christian faith.

Another name is now to be added to the list of those Mohammedan monarchs, who in this formative period still further advanced human progress, and gave treasures of learning, and art to Europe. It is the name of Almaimon, the seventh khalif of the house of Abbas. Thoroughly educated by the Greek and Persian philosophers of the court, it was his chief pleasure to surround his throne with the concurrent wisdom of the world, irrespective of race or creed. Among his most distinguished *savans* were Jews. A Nestorian Christian was his superintendent of public instruction. He issued an edict to his government officials in all parts of his empire to collect everything pertaining to literature, science

[1] Card's Charlemagne.

and art, and thus during his whole reign, caravans of solid learning, of books, pictures, maps, specimens, were seen converging to the great repository at Bagdad, where skillful hands were busy in analyzing, classifying and systematizing them.

Particularly interested in mathematical and astronomical studies, Almaimon put two parties in the field to measure a degree of latitude on the earth's surface, and thus to determine approximately the dimensions of the earth itself. And all these labors of Almaimon deserve the greater praise from the fact that his zeal and liberality for the cause of science, caused him to be suspected by many of the faithful of want of loyalty to the Koran. The astounding developments of science did indeed begin to injure the revelation of Mohammed, and progress in science rendered a man liable to the charge of heresy. The safety of the Koran at a later day is doubtless due to the decline of learning at the East. It would be very interesting to give in detail the advance of science at the East, but it forms no part of my purpose. I have referred to its origin there in order to show how it passed thence into Spain.

As soon as, under the first Abdu-r-ráhman, Spain became an independent kingdom, the enthusiasm for polite and useful learning thus exhibited at Bagdad spread like summer fire along all the lines of original conquest. Africa felt the impulsion. Teeming schools and large libraries were established at Morocco and Fez. A new band of better conquerors crossed the narrow sea to Gibraltar. If, as we have shown the direct conquest of Europe by force of arms had been impossible, these Arab-Moors were to achieve a moral conquest far nobler; to make an intellectual incursion which was to be acknowledged in the schools of Oxford, and to be felt "as far as the confines of Poland and the Highlands of Scotland." They were to throw a flood of light upon the darkness of western Europe. At the same time they were to arouse Christendom, binding all its portions in a grand rally for the doctrines of the Crucified; positively, to instruct, and, negatively, to strengthen. Thus we reach the subject of the Arabian civilization in Spain.

In emulation of the example of the East, the first purpose of Abdu-r-ráhman Addakhel was to make Cordova in all respects the rival of Bagdad, which, in the words of Ibnu Said, was recognized as "the capital of the world and the mine of every excellence."

In this purpose he was eminently successful. Making all allowance for the tendency of the enthusiastic Arabian chroniclers to exaggerate the figures and the magnificence, enough remains of the splendor, the mechanical inventions, the political energy and the social luxury of the earlier khalifs to excite our admiration and astonishment.

Cordova, an ancient Roman city, the capital of Hispania Ulterior, sacked by Cæsar after his quarrel with Pompey, had degenerated under the Goths. It was chosen by the first khalif as the seat of his empire, and gave a title to the khalifate. Sunken as it now is into a little dead, still, white city, it contains magnificent relics of the day when it was the splendor of the Western world, a nobler Bagdad. Among these is the Mezquita, or Mosque, now a Christian cathedral. For three centuries, from the ninth to the twelfth, and especially during the reigns of the three Abdu-r-ráhmans and Alkahem, Cordova gloried in this distinction. It was the most magnificent capital in Europe. Its long, winding and numerous streets were brilliantly lighted at night, at a time when, in the words of another, London was yet in profound darkness; and it was completely paved and scrupulously clean, when Paris richly deserved its name *Lutetia*, or the muddy.

Cordova had its *Kassábah* or citadel with wall and moat. The exterior walls of the city extended in periphery twenty-four miles. There were twenty-one suburbs, and to all this vast extent a splendid acqueduct supplied pure water from an adjacent mountain. Here Abdu-r-ráhman built a palace, the *Rissafah*, in the midst of a magnificent garden, the floral wonder of the world. Around the city were other royal villas or retreats bearing such romantic names as "the palace of flowers," "of the lovers," "of contentment," "of the diadem;" but chief among the surrounding marvels was the palace and city of *Az-zahra*, erected for and named after his chief favorite at her own request. It was situated four miles from Cordova, and its materials were collected without regard to expense from all parts of the Arabian world. The Arabian writers dwell with great fondness upon still another palace, called Az-za-hirah, upon which the khalif exhausted wealth and taste. The details are so minutely given that we cannot doubt the existence of these structures, although the traveler of to-day

seeks in vain for a vestige of them. This search has thus far, it may be said, been, however, rather superficial.

In Cordova itself there were three hundred mosques, besides many tolerated Christian churches, six hundred inns,[1] five thousand mills, highly cultivated orchards, gardens and plantations along the banks of the river. What this favored place was to its native children, when away, may be gathered from the anecdote that, when a certain Abu-Bekr, went from Cordova to Toledo, his friend Almak-h-zumi asked him whence he came. "From Cordova." "When?" "Just now." "Then," said the sheik, "come near to me, that I may smell the air of Cordova in thy garments." With that he began to smell the traveler's head, and to kiss it all over, and he broke out in tearful impromptu verses in praise of his native city: the Arabian muse delights in simple pathos. The palaces and mansions of the noble and rich were of great luxury, in construction and in furniture. There was little ornament on the exterior. If nature was shut out, the interior of each mansion was a temple of pleasure and of taste, and nature was made to cater to art.

A few of these remain to indicate to the traveler what they were in that halcyon day. I shall not attempt to describe any one of them, or to borrow the eulogiums of the chronicles, but shall only present to the reader distinguishing features which marked them all alike,[2] and which may still be seen and enjoyed by the tourist in Spain.

A massive *porte cochere* opens into a paved court yard, in the center of which is the never-failing fountain. The peri-style of the gallery running around it is supported by slender columns of alabaster or polished marble, from which spring numbers of graceful horseshoe arches. Above these are the grated or latticed windows which mark the seraglio. Imagine the columns partly or

[1] It is worthy of notice that to-day Cordova has but two hotels, or *fondas*, not of the first class.

[2] These features have been retained in social Spanish architecture to the present day. When I was in Seville, I saw a palace just finished in the complete moorish style, as exhibited in the Alcaçar and the Alhambra, by a wealthy Cuban gentleman. It is a splendid anachronism; it takes the traveler back to the very days of the Abdu-r-rahmans. It stands on the Plaza del Duque, and cost half a million of dollars.

wholly gilded, and everything radiant with painted arabesques, in rainbow hues of red and blue and gold. Over this court was drawn, to shut out the mid-day heat, a costly awning, and here the household gathered for that dreamy siesta, still one of the *cosas de España*, lulled, rather than disturbed by the plashing of the waters. Rare tropical plants in huge *jardinieres* lend a natural grace to the court. It was a fairy caravanserai in the oasis of Andalusian life.

Let us pass on from this court through a double archway into another court-yard similar in proportions and surroundings, in the center of which is a great *estanque* or oblong basin seventy-five feet long by thirty in width, and six feet deep, supplied with limpid waters raised to a pleasant temperature by heated metallic pipes. Here the indolent, the warm, the weary may lave in luxurious languor.

Leaving this extensive bathing hall by a postern in the gallery, you enter a fairy garden with mazy walks, and blooming parterres and artificial grottos, and kiosks of stained glass. The terraces are of polished marble, with gilded columns and balustrades. The ponds are filled with gold and silver fishes. Water is everywhere; there is one hall literally walled with fountain jets and columns, meant to bid defiance to the fiercest heats of the summer. With the Arab-Moor water was not a luxury but a necessary of life; ablution was not more a religious cermony than a domestic enactment. Nor was this confined to the higher classes; we are informed that many of the poor spent their last dirhem for soap; preferring rather to be dinnerless than dirty.

If we would conjure up the figures of that early day to people such a house as we have described, the task is not difficult. The effect of their costume was that of loose cloths gathered loosely about the form. The original Moors wore a gown or long sack gathered with a belt at the waist, and over this a flowing-sleeved mantle open in front; beneath were loose drawers gathered around the ancle. Sandals were generally worn in walking, but heelless slippers took their place in the house, such as may be still found in the bazaars of Tangiers and Morocco. A cloth covering was placed upon the back and sides of the head, upon which at the date of the conquest the Eastern turban was adjusted; but no great time elapsed before the turban was abandoned in Spain, and

a woolen cap of cylindrical form, since called the *fez*, was adopted in its place; it was red or green for the Moslemah, white for the Muzarabs,and yellow for the Jews. So completely had the turban disappeared in the lapse of a century, that when an Oriental appeared with one in Andalusia, he was laughed at as very outlandish and unfashionable, an Eastern importation of what was behind the age.

The famous Spanish *capa* or cloak of the present day is indeed a modification of the Roman toga, and was worn by the Goths before the conquest, but it was soon adopted by the Arab-Moors, who called it *anda*,[1] and who made it, like the modern Spaniards, a concealment.

The costume of the women is not so easily described in detail. The principal part was a close fitting sack like a *peignoir*, a flowing mantle or saya, full drawers and heelless slippers. The *mantilla* which the Moorish ladies certainly adopted from the original inhabitants, was a long-oblong-shawl, which was fastened to the back of the head and drawn easily over the face as well as the breast. It is the perfection of the graceful in woman's dress.

It has been difficult to find accurate descriptions of the arms offensive and defensive, with which the Arab-Moors conquered Spain. They had the mace and the long-bow. They managed with great dexterity the spear, which was a long and slender reed, which might be cast like a javelin or used as a lance in rest. They had swords of various shapes, the short, thick hacking sword, the sharp, curved flexible cymetar—and the cut and thrust.

To cover their persons they wore, for the head, a light steel headpiece; and for the breast, a thin, well-tempered cuirass, or coat-of-mail. Their bucklers were of leather, made of antelope-skin, which is noted for its strength and toughness. In the earlier conquests of Islam, such light arms and armor allowed them dexterity and mobility, but as the Spanish Christians gathered spirit and strength, the Moors found them lacking the requisite power, and they imitated their Gothic enemies by adopting heavier closed

[1]The *capa* remains as the most distinctive feature of Spanish costume; and it is a common saying that a Spaniard would rather part with his skin than his cloak. Its form and dimensions are rigorously prescribed—a full circle measuring *seven* yards all but three inches and a half. It is of sober color, and is lined on the front edges with black or green velvet.

helmets, iron shields and complete mail. The cross-bow largely replaced the long-bow.

I have spoken of the glories of Cordova, because it was their capital; the splendors of Toledo, Seville, Cadiz and Granada, would present exceedingly interesting topics, if our space served. But I turn aside from these brilliant pictures to consider a matter of more practical importance—the system of officers and government established by the Spanish Arabs.

The dominion of the khalif was eminently theocratic; this was all that preserved it from being entirely autocratic. He ruled by the precepts of the Koran, which served in all Mohammedan countries for law and for gospel both. That can hardly be called an absolute dominion which must govern itself by laws daily read in every mosque, and expounded in every school; laws which seem more binding upon the governors than the governed. From a work by Ibnu Said, entitled, "Shining stars in the just and partial descriptions of the Eastern and Western governments," we may gather the offices and methods of administration. As we have before seen, the ameers or governors of Spain, were originally appointed by the Vice-roy of Africa, subject to the sanction of the supreme Khalif. Even after Moslem Spain threw off the Eastern yoke, and became independent under the Ommyan dynasty, the new monarchs called themselves, until Abder-y-râhman III., *Ameers, sons of the Khalifs.*[1] That sovereign first assumed the title Prince of the Believers. From the first, however, the principles which actuated the new dynasty were,—great rigor of administration, entire impartiality, and a becoming splendor in the monarch and his court.

The *nayib* or Grand Vizier was the prime minister, who had under the monarch the general charge of public affairs. The concerns of the state were divided into several branches each under a *hajib* or subordinate vizier. Thus there was a minister for foreign relations, one for finance, one for justice, and one who had control of the army and navy. At first these officers were ap pointed by the khalif, but the they soon became hereditary in families, always subject to the approval of the khalif, which in-

[1] In the history we find the *Emirate of Cordova* interchangeable with the *khalifate.*

weak reigns was easily extorted. Often the minister was more powerful than the monarch.

There were besides these, special secretaries appointed, called *katibs*, who under the ministers conducted the correspondence—with allies or with enemies; in matters concerning the residence and protection of Christians and Jews; and with the provincial governors.

The *Sáhibu-l-ashgal*, or collector of revenues and taxes, was an important functionary who ranked among the chief viziers, and who seems to have conducted his department with great exactitude.

Besides the executive cabinet thus formed, the department of justice was confided to numerous judges or *kadis*, who were possessed of extraordinary powers. They took cognizance of all crimes against morality, and could sentence any offender to death. Among these was one in each town called the *mohtesil*, whose duty it was to ride through the markets daily with an attendant bearing a pair of scales; he fixed weights and prices, and rendered false weights and measures and extortion impossible.

To guard against the entrance of the robbers who plied their trade in the environs of cities, at every gate was a watchman, with a dark lantern, in easy communication with a guard of troops.

The provinces were governed by *walis*, who reported at stated times to the central government. So extensive was the military force, under a proper order of generals, that one of the earlier khalifs is said to have held in the plains of Cordova a review at which the troops numbered 600,000 foot and 300,000 horse, all splendidly equipped.

Besides the heavy tributes and customs paid by Christians and Jews, uniform taxes, called *zakah*, were levied on all the Moslemah. Of the revenue thus collected, we may form a general idea from the fact that in the reign of Abdu-r-ráhman III. it amounted annually to $15,000,000. Of this sum one-third was used for the support of the military establishment, one-third for the civil government, and the remainder was put into the coffers of the khalif for his own use, and as an extraordinary fund.

The question of the treatment of Jews and Christians does not

seem to have been a troublesome one. Rigorous in obeying the requirements of their own creed, and believing all others to be false, the Saracens were yet far more tolerant to unbelievers than the Christian sects have in later times been to each other, and than all Christians have been to the Jews. Apostates only they punished with death. Let it be observed that their toleration to all others was a generous and politic habitude rather than a prescriptive law, for their religion gave them the abstract right to destroy all unbelievers. They were, indeed, invited and urged to accept the Koran as the perfect revelation, but, if they would not, the payment of the prescribed tribute entitled them to perfect toleration. The Christians in the chief cities, who adopted Moorish customs and the Arabic language, while they still retained their religion, were called *Muzarabs*, from the Arabic *Musta-'rab*, meaning one who imitates the Arab. When these cities were reconquered by the Spanish Christians, they found a Christian prayer-book in Arabic, since known as *El Oficio Muzarabe.*

I will conclude this paper with a reference to the polygamy of the Saracens. Although the uncommon passions of Mohammed had emended the Koran to allow himself a greater number of wives, it must be remembered that his system rather restrained an existing polygamy than established a new custom for his people. And although the Spanish khalifs availed themselves eagerly of the Scripture permission, and the nobles followed their example, I am inclined to think that polygamy, repulsive as it must always be, is less so as exhibited among the Spanish Moors than elsewhere The intuitive romance and poetic judgment of the ardent Arabian nature, and the beauty and grace of the women which still enchant the traveler in Andalusia, seem to throw around their domestic relations an atmosphere more akin to conjugal attachment than is to be found among the degraded races of the East. Their poets sung the charms of woman's loveliness as witchingly as does Moore in "the Light of the Harem," while from the harem itself came forth strains of true poetry which show the culture of woman's mind and the elevation of her position.

HENRY COPPÉE.

YOUNG WIDOWS.

"BEWARE of widows, Sammy," is not especially funny or clever, but it has hit the popular feeling. There is a wide-spread prejudice against widows, and as the world has a large experience of them and their ways, it must have some warrant for distrusting them. For our own part, we will not say that our observation has led us to quarrel with Mr. Weller's warning.

The loss of her husband leaves a woman only half herself. The best apology for second marriages is the utter emptiness of a young widow's life. For a time after her bereavement she spends herself in honest and heartfelt grief. She even exaggerates her loss. There is no taste in food and no flavor in wine. The sun is never to shine nor the flowers to bloom for her again. The sad remnant of her life shall be devoted to cherishing the memory and adorning the grave of her departed. All day and every day she spends in the house, except when she steals by unfrequented ways to church. Her room is a shrine, filled with memorials of her sorrow. His picture lies under the pillow at night. His letters are worn with handling, and blotted with tears. Day is too bright for her; she cannot endure the eye of a stranger. When duty calls her into the streets, she envelopes herself in a veil through which no regard can penetrate. Her dress is the deepest and plainest of mourning. The men who used to know her husband, and remember him as a good sort of fellow, not much better nor worse than his neighbors, half envy his transfiguration, and hope, when their time comes, to be mourned as truly. If she has a child, she spoils it of course. By some process of comparison, purely feminine, its round face and childish treble remind her of *him.*

At this stage she especially affects the society of her fellow-mourners. Two widows will spend half the day together comparing the virtues of their respective husbands, relating the details of their married life, and confirming each other in morbid fancies and resolves. They dwell upon their utter distaste for the

world, and speak of more facile sisters with compassionate disdain. "Why, Laura, I saw Mrs. Thompson in church this morning, and she had her dress trimmed with silk ruches! and Tom only died in August." "Well, my dear," says Laura, "some people can do that sort of thing." And she looks down with pride upon the plain black folds which guard the integrity of her woe. She is apt to take a religious turn. She keeps clergymen running to and fro. Little books of pious consolation abound on her shelves; and she sends them to her friends with her favorite passages doubly-scored.

But this cannot last forever. Gradually the weight of grief is lifted from her heart, and the natural buoyancy of youth comes back. There is freshness in the springtime again, and sugar is sweet to the taste. And now begins the stage in which the young widow is so amusing. It is hard, the proverb says, for a woman to grow old gracefully. It is still harder for her to come gracefully out of her widowhood. The best thing for her to do is to travel, or to spend a year somewhere away from home; away from the people who have witnessed the excesses of her grief, and who can contrast the present with the past. But she is apt to stay at home, where every step of the process of recovery can be watched. It is a swift convalescence, and for any one with a cynical turn, rather a ludicrous one.

The first symptom is interest in dress and a gradual enlivenment of costume. One by one the little feminine adornments creep in. She changes the fabric of her black dress to a material in which the outside world may see no difference of texture, but which, by an immemorial tradition of the mourning counter, signifies that she begins to feel better. Trimming begins to appear, and jewelry of sombre jet, not ineffective against the white neck and arms. The widows discuss every alteration in conclave. "My dear, what shall we put on after we leave off folds? I don't know what comes between folds and ruches. I suppose box plaitings." She imagines that all the world notices the change from bombazine to cashmere (we are not using these terms at a venture), and hardly dares go to church in a ruffled dress; whereas none but other widows, and perhaps a few dowagers, pay the slightest attention to these portents. But everything depends on ones point of view; and there is something peculiarily dreadful to

the feminine mind in hearing it said that Mrs. Thompson is wearing silk ruches, though Tom only died in August.

We are inclined to say that never in a woman's life, not even during her first "winter out," is the question of dress so absorbing as in this transition state. For the information of masculine readers and girls who have no friends among the bereaved, we offer this summary of the five stages of widowhood. We have consulted very high authority, and our facts may be relied upon:

1. The dress of black bombazine, perfectly plain; a thick crape veil; a widow's cap; no jewelry except a jet locket; collar, etc., of crape.

2. The veil thrown back over the bonnet; a little trimming on dresses; white collars.

3. The cap disappears; a lace veil is worn instead of the crape; more trimming.

4. "Dressy" mourning of silk, with feathers in the bonnet.

5. Half mourning—purple and pearl color.

The cap is very important. It is understood that when it finally disappears the world has resumed its charms, and that young men conversationally inclined will not be discouraged. Ostrich feathers and dotted lace veils are extremely gay, and the wearer may soon be looked for in purple.

There is at this time a disposition to tell young men the story of her experience She assumes the airs of an older sister, and puts her knowledge of the world and of mankind at their service. Her married life is detailed for their edification, and she cautions them against those mistakes in their choice into which young men are so apt to fall. *She* looked forward to the union with a man of her heart as the entrance into Paradise; but she found well, sometimes she was not wholly understood. Still, her married life was very happy; so happy that her present loneliness is very hard to bear. Her consolation now is in the remembrance of having done her duty, and in the help she is able to give to those in whose happiness she is interested. In the case of each, it seems, she has studied his character. Very few women, she fears, would understand it, for it is not an ordinary one; she knows, however, he will allow for feminine weakness, and not expect too much. If the widow is endowed with ordinary good looks, and her listener retains that susceptibility which used to be

an attribute of youth, how powerful is the suggestion that all the unhappiness which he begins to fear is mingled in the first years of married life, may be avoided, if only he can gain a companion so gentle, so sympathetic, so versed in men, as the cooing creature beside him!

But, after all, she is only a little foolish, a little out of her natural position. If we laugh, it is with the feeling that there is not much to blame. But there is another type of women upon which widowhood has a more unpleasant effect. It is with girls that one of this class should be studied. Their age she entirely ignores. Older or younger than herself, they are not married, and of course they know nothing about the great realities of life. Many of us have known some boarding-school chit, neither the prettiest nor the brightest of a family, who possesses an inexplicable attraction for some unlucky man. He dies, perhaps, a year or two after marriage, having had time enough to appreciate his mistake, but not enough to effect any change in his wife's character. She appears to the world as frivolous, as narrow, as ordinary as her girlhood promised to become; but among her family and her intimate friends her marriage has invested her with dignity and wisdom. She is supposed to understand the tricks and manners of the creature man, his tastes, temper and habits, together with the art of captivating and managing him. She is the confidante of flirtations, and even of declared love affairs, and, in her capacity of monitress, does more mischief than one would think possible. The remembrance of her own incomplete *vie a deux*, of the sorrow which follows her girlish dreams, fills her with a certain bitterness. In those sacred precincts of the upper story, where the back hair is let down, you would scarcely know the sympathetic friend of man. She may have been notoriously submissive to her husband's veriest whims, but her advice is thoroughly aggressive. "Never own yourself in the wrong, my dear; if you once do that, you may as well give up." "Don't show him you care for him too much; he'll like you all the better for being reserve." The sweet natural impulse which inclines either of the couple to give way to the other is sternly discountenanced. If some little dispute arises between lovers, which they would settle in ten minutes with a kiss, and she is unhappily consulted, her voice is loud for war. "Don't give up, my dear; you're preparing a very

unhappy life for yourself by letting him have his way so." Sometimes she causes infinite trouble and heart-burning, but oftener the victory is with almighty love, and she is discarded from her mischief-making post. But it is amusing to see how thoroughly she believes that her trumpery two years' experience of a single man has imbued her with that wonderful knowledge in which the wisest are only learners—the knowledge of the human heart.

Upon this narrow foundation, however, the young widow's idea of matrimony is solely built. She is secretly surprised that her sister's lover should be in any respect unlike her own. She consoles herself in the conviction that when the honeymoon is over and the necessity for concealment is gone, he will display all the foibles and weaknesses which she found in her husband. For diversity of character she makes no allowance. One is tempted to wish for her speedy remarriage, if only that she may discover how widely men differ. Second nuptials, indeed, are the young widow's manifest destiny. If she fails of it, the tinge of envy with which she regards the happiness of others may deepen into downright ill-will. Her family and her friends, who lavished upon her so much tenderness and pity in the first years of her widowhood, grow tired of her silliness aud discontent. But at this juncture, let us hope, she finds a man so unlike his fellows that she can trust him with her future. She marries again, and her bitterness melts away like a cloud in the sunshine of a happy life. * * *

THE FINANCIAL CRISIS.

IN the physical body health is always the accompaniment of rapid circulation; disease, that of a languid one. So the pub- health is destroyed when the societary circulation is hindered, and restored when it is re-established. Societary circulation is perfect only when men and women can find persons willing and able to pay for their labor; when farmers, shopkeepers and work- men in mills, workshops and furnaces, can find buyers for their products; when railroads, canals and ships can do a good trans- portation business; when landlords can collect their rents, and when the interest on debts, public and private, can be paid with regularity.

The one thing necessary for effecting these changes is what is known as money. In times of panic, money is scarcely anywhere to be found, from the fact that real money, whether gold, silver, copper, or circulating notes, bears so small a proportion to the various kinds of credits based upon it, that when the crisis comes, when all credit is destroyed, it can only be had on terms so one- rous as to be ruinous to the borrowers. As a consequence of this, the value of commodities will shrink in proportion as the socie- tary circulation becomes more and more impeded, the whole debtor class will become bankrupt, and the business of the nation become paralyzed.

For ten years we have increased our domestic and foreign com- merce to such an extent, that distant sections of our own country, and distant nations, have been brought into close proximity; our exports have increased; the number of our mills, furnaces, coal, iron, gold and silver mines, houses, ships and supplies of food have been increased to an extent never before known; we have diversified our industry until we are now, for the first time, inde- pendent; we have been able to pay taxes that not only enabled the government to meet the interest on the national debt, but also to decrease that debt from March 1, 1869, to October 1, 1873, $386,669,361.84, with less difficulty than, prior to the war, we met our small liabilities. There is no case of a financial success so complete in the history of the world. The crisis through which

we have just passed has been shorn of more than half the evil consequences that would have resulted had the circulating notes been redeemable in gold, from the fact that we were, in a great measure, relieved from a foreign pressure to sell in our markets the certificates of debt, held abroad to the extent of hundreds of millions of dollars. Had it been possible to force the sale of these securities, the ruin would have been universal; the ruin of the banks, the railroads, the manufacturers and the merchants would have come first, to be followed by both public and private bankruptcy.

At this time, although a few of our great bankers, a few merchants, a few manufacturers and a few railroads have been unable to discharge their debts, the country as a whole is prosperous. Every man who desires to work can find a purchaser for his labor. Every man can sell the product of his labor. With every stage of progress the societary circulation has become more rapid; credits, that is the power of man to make his credits pay his debts, the Clearing House and the system of offset have so lessened the use of money that it is in times of confidence used only to settle the balance due from one man to another, one community from another, and one nation from another, therefore the rate of interest has fallen with a constant tendency towards equality in the rate paid by the owner of the small shop, and by him who controls great railroads, mines and mills. The working man is put upon the same footing as the capitalist.

This country has grown strong; the amount of fixed capital has become great, and all this has been accomplished with a paper currency—a currency not redeemable with gold. At times, however, the currency is quite equal to the demands of trade; at times it falls far below the requisite amount. We have suffered and we are now suffering from the want of elasticity. We need a currency, the amount of which shall at all times be commensurate with the requirements of the country, that is, increasing and diminishing according to the natural law of supply and demand. To this simple law is due the fact that the circulation is so very nearly a constant quantity in communities that are truly independent. Crises, panics, inflation and contraction of prices do not depend upon the use of gold or paper as the medium of exchange. There have been financial panics and crises at all times, under all

circumstances, both when gold was the money in use, and when paper had taken its place. Inflation is brought about by the extension of personal credit, by confidence in the future, far more than by any one other cause.

The amount of circulation needs no regulation, for the reason that trade regulates it. The legislators and the banks can surely never determine how many notes shall be in use, for they can exercise no control over the matter. It would be quite as wise to pass laws determining the number of horses and cows a man should keep, or the quantity of coal, cloth and food a man should consume, as to fix the amount of circulation. The people will and must always regulate the matter for themselves. We urge the necessity of making banking as free as ship-building or farming, giving the banks what circulation the people demand; provided that the validity of the note is always secured, so that at all times it shall be a valid tender in payment of debts. We no not believe in any increase in the amonnt of the legal-tender notes, for that issue would, in all probability, be rigid—the amount so issued be fixed by law.

Free banking would restore the societary circulation, for it would give the mill-owner power to pay the wages of the laborers, the laborer power to pay for the food and cloth used by his family, the shopkeeper power to make payments to the city trader; rents would be paid, and prosperity would once again take the place of disaster. The excess in free banking would be checked through the difficulty in obtaining United States bonds, to secure the circulation.

The question now prominent is the one of specie payments, which, notwithstanding the clamor for early resumption, must of necessity be deferred until the prosperity of the nation, resulting from the healthy export of our products, shall enable the government to redeem in coin the $400,000,000 of notes made legal tender by an act of Congress. When this large amount, made money only by government decree, can be provided for, then it will be easy for the banks and the people to resume, and not till then.

Let us hold fast to the doctrine that has enabled the people to substitute domestic iron and cloth for that made in foreign furnaces and in foreign mills, and we shall soon be in a position to redeem these dishonored notes.

NEW BOOKS.

PAY-DAY AT BABEL AND ODES; by Robert Burton Rodney, U. S. N., author of "Alvin and Rosamond." D. Van Nostrand, New York, 1872. Price $1.00. Pp. 65.

Lunacy, it appears, is no disqualification for positions of honor and emolument in the naval service of our country; let those who doubt, buy this work. The lines on p. 10, descriptive of women, are alone worth the price. To us it is the sublimest height misogyny has ever reached. Rodene (*i. e.* Rodney), the hero of the "Pay-Day" says, giving as one of his reasons why he has never married:

> "The fairest seem to me but flesh awaiting,
> Inspired with *life's faint antiseptic*,
> Its hour of corruption."

THE CROSS OF BERNY; OR IRENE'S LOVERS. A Novel. Philadelphia: Porter & Coates, pp. 290.

The Cross of Berny is formed of four pieces; and this book is the production of four authors. The story is of a girl with whom three men fall in love. Madame de Girardin writes the heroine's letters, and M. Theophile Gautier, M. Jules Sandeau, and M. Méry those of the respective lovers. The characters of the men are strongly contrasted, and each is intended to reflect the predominant mood of his creator, so that each letter, besides advancing the plot, displays the individuality of a well-known author. The rapid sale of such a book in France, when the four *collaborateurs* are familiar names, is easily accounted for. Take for instance M. Gautie He has died within a few months, leaving the reputation of the most brilliant and subtle of word-painters. His worship of color nd form was the most intense part of his nature, and impressed itself alike upon his prose and his poetry. "Emaux et Camées" is the appropriate title of his verses, as solid and perfect in form as a jewel or a statue. In this volume he has created a hero after his own image, a hero who loves Irene for the curve of her neck, and the perfection of her contours. His rival says of him, "His love could not withstand a pencil stroke which might destroy the harmony of the whole. Beautiful as she is, he would desert her for the first canvas or the first statue he might encounter. Her rivals already people the galleries of the Louvre; the museums of the world are full of them. He loves this woman as an artist; he has made her the delight of his eyes; she would have been the joy of my whole life." One of his artistic whims, a debauch upon haschich in a mock seraglio, ruins him with Irene. Another rival, very well drawn by M. Méry,

comes to grief from a peccadillo at the Italian opera. He is seen in a box with a "fast" set, young men about town and girls who have stood as models for the most famous statues in Paris. This is enough for the high-flown Irene, who will allow no explanation or mitigation of the offense. She has doubtless resigned herself to celibacy, for her ideal, as portrayed in the first chapter, is somewhat hard to find. "His eyes are black, full of sadness and fire. His glance has none of the languishing tenderness of romance, but is proud, powerful, penetrating—the look of a thinker, of a great mind yielding to the influence of love, the gaze of a hero disarmed by passion! * * * He is mysterious; he never utters his thoughts, but lets you divine them. You are never at ease in his presence; there is a graceful dignity in his carriage, an imposing gentleness in his manner, that always inspires a kind of fear, a pleasing awe." One might hope that such an ideal was too unpleasant even for fiction, but he turns up at last, fresh from the hands of M. Sandeau, and is worse than could be conceived by any one but a sentimental Frenchman. He gives his entire fortune to a school-friend on the verge of bankruptcy. "I left him at the door of my notary, and joined him on coming out. 'Frederick,' I said, giving him a line I had just written, 'take that and hasten to embrace your wife and children.'" We are not familiar with the Code Napoleon, but this summary method of transfer reminds us of the "paper" that has such mysterious power in the eyes of our feminine novelists. Mrs. Wood can prove a murder, change the devolution of an estate, or sell any quantity of landed property by a "paper." M. Sandeau can apparently do as well with a "line." Of course this sentimental hero wins the heart of Irene, and the two maunder on till a long-suffering Providence puts an end to them in a common catastrophe.

Save for this sentimental vein, the story is excellent,—bright, epigrammatic and occasionally quite interesting. Whatever may be thought of the others, M. Gautier and M. Méry will lose no reputation by The Cross of Berny. R. S. H.

THE following, translated from "The Critical History of Philosophy from its Commencement to the Present Time," by Dr. E. Duhring, Teacher of Philosophy, etc., etc., in the University of Berlin. Second Enlarged Edition. Berlin, 1873, Heimann's Publication (Erich Koschry), is given to our readers as a remarkable bit of philosophical criticism. Dr. Duhring's amenities remind one of the argument in Longfellow's Golden Legend between the two professors of Salamanca, and rivaling the fine old masters of obloquy, even Julius Scaliger himself, his review of Herbert Spencer may be aptly if not elegantly classed as the "merda diaboli" order of controversy.

Whatever may be the result of our criticism of such a thinker as Stuart Mill, his writings form a favorable contrast to the antiquated results with modern coloration to which Mr. Herbert Spencer, a somewhat younger philosophiser, has attained by a retrogressive course of thinking. This artist in psychologically falsified rubbish of ideas, who partly leans upon such philosophical phenomena as the Scotch Aristotelian, Prof. Hamilton, partly avails himself of the more special results of Auguste Comte's works, while at the same time disavowing them; who accumulates with the slavish industry of a Caliban (*see Shakspeare's Tempest*), scientific matter of the greatest variety, and fills a number of scientific categories with unspeakably dry and prolix details of deductions, and who feeds upon mere refuse either of knowledge or of belief, published in the beginning of the fifth decade of this century a book entitled "Social Statics." This production, a critique of which is not here in place, to be sure, but which is likewise of too little significance for the special department upon which it bears to be entitled to any place in the history of national economy and social science, contained nothing but the most vulgar reflexes of the then prevailing theory of com mercial freedom, besides unspeakably tedious moralizations of a social conservative character, without any practical bearing whatever. Since that time the author in question has produced still other works on the same subject, and since 1860 undertaken a very broadly planned execution of the categories of his alleged "system." His "First Principles" are a strange mixture of the influences of some ideas of natural science in vogue during the last generation, of a somewhat brutal conception of schematism, as applied to nature, and of the tendency to philosophically guarantee a threadbare belief of extreme wanness, to be sure, but yet opening the door for the desires of a world in need of religion and for the accomplishments of priests. This "philosophico-religious" doctrine, as he himself calls his simultaneous worship of the "Unknowable" and "Knowable," has, of course, met with the greatest sympathy among some groups of the American public, because there the need of fixing the religious ideas which are more and more receding before the progress of science, is almost as fresh as that superficial science itself applied to first principles. There (in America) hardly exists a real philosophy of a higher degree, but indeed an intensive purely social veneration of priestcraft. From there then delegations of his worshipers have indeed brought golden chronometers and most acceptable thousands of dollars to Mr. Spencer. The method by which this Englishman has tried to solve the a priori insolvable problem of reconciling religion and science, consists in his efforts to degrade science by attributing to it only a relative authority, and

sophistically to deny its capacity for producing absolutely authoritative truths of last resort, while at the same time he lamentably exposes his own ignorance to the more learned expert in special departments of science. So has he, for instance, been seized in his more recent enterprises, and especially in the compilation of his "First Principles," by the far-spread monomania which has already fatally compromised many a philosophiser and superficial cultivator of science, to grapple with the modern thesis of the indestructibility of mechanical force. Although the manner in which Mr. Spencer groups his principal conceptions around this thesis, does not recall those wild and confused aberrations of an unbridled imagination which the after-birth to Schelling's abortions among German philosophizers even in our days claims as "Philosophy of Nature," yet this Englishman who principally indulges in psychological disquisitions, and is fond of playing with unscientifically vague analogies, lacks a sufficiently precise and accurate knowledge of the fundamental ideas of mechanics. This fact appears so much the more comical, as he undertakes to reduce everything for which he claims the name of system to these fundamental ideas, and persists in expressively requiring everything in the world to be expressed by the categories of matter and motion. This comical sham-materialism with its priestly second-sight is entirely bereft of its guise and disclosed in its true nature, when we learn, that the indestructibility of matter is to be taken only as a corollary to the indestructibility of force, and force merely as a "symbol" of the "Unknowable," in which of course everything in general, and the validity of science in particular, is absorbed, or in other words most submissively dissolved, into a meaningless nihilism with which faith can be suitably mated. On arriving with Mr. Spencer at the "First Principles," science makes her courtesy before something inaccessible to her, and at this sacred adytum she falls reconciled into the embrace of Religion. Thus, then, not a single thesis remains clothed with absolute scientific significance, but everything is transformed into a meaningless or even ambiguous symbolism for which even the clearest a priori ideas, such as those of absolute time and space, of uncreated matter and of the invariable amount of mechanical force, are weakened to phenomena of merely psychological validity and thus made harmless.

What is claimed as a specific scientific peculiarity on the part of Spencer's combinations, viz: a supposititious law of so-called evolution, must at least be briefly mentioned here in order to prevent the misconceptions that necessarily are called forth by this word, which has been chosen without any linguistic discrimination. For the Englishman in question calls all condensation of matter an evolution to which he contrasts its dissolution, and

thinks to cover with this palpable and superficial schematism the innermost plastic processes of generation and formation, inclusively of the organic, vital, psychological, social and political processes of formation and re-formation. He really seems to consider it a discovery, when he conceives the evolutions as "concentrations" of matter. This latter clumsily extraneous manner of conception, which by a vague play with analogies is transferred upon the world of man, and, for example, upon the condensation of population, is now the nucleus of the so-called law of evolution. With the true idea of evolution, as corresponding with the meaning of the word, this extraneous and clumsy schematism has nothing in common. The natural manner of conceiving the idea of evolution is most ancient and has been revived during the last century on the part of the science of organic nature. The attempts of Mr. Spencer at schematizing nature appear so much the more odd, as the subordinate parts of natural science of a more descriptive, or at least of a less exact character have to a far greater extent occupied him in his studies and literary products, than the more exact departments, especially those connected with mathematics. But we must not forget that Mr. Spencer has altogether a very inferior and inadequate idea of philosophy. To him philosophy is equivalent to unification of the sciences, and thus receives that superfluous task which is even injurious to it, or in the best case only a rational cyclopedic one, such as has in a better form constituted a part of Comte's enterprise, though only the less important part of the philosophy of this French thinker. The philosophically colored reproduction of the single sciences is for the most part only a disfiguration of their contents, and he who is not able to compete with the foremost representatives of any department of science, may keep his hands off and not prostitute philosophy itself by so-called "philosophical" rehash. Such a man as Stuart Mill has at least in this respect exhibited a greater practical tact and an expedient reserve. He has by the extent and subject of his publications not exceeded a modest measure, and really contributed to concentration, without again serving up the several sciences with a philosophical sauce. Thus he has not, like Mr. Spencer, been in need of resorting to subscriptions for the sake of circulating his books among the public, but could trust to the ordinary chances of the book trade. He was at least in accord with the progress of the time, and therefore had no need of seeking a market in America, as Spencer for his retrogressive productions. Nor did he need to speculate upon the remnants of religious wants, with which business Mr. Spencer is pretty well conversant, and which can be highly recommended to the scholastic professors of philosophy in all countries, and also in our country, which is now in very great need of it, as a mine

for more refined and apparently less harmful disguises of a hermaphrodytical union of faith and science

Indeed a great part of the temporary practical value of Mill's disquisition of logical theories, as contrasted with Spencer's illogical method, rests upon the simultaneous fact, that the former has in a certain measure paid regard to the center to which modern interests gravitate, and in doing so has not fallen into a retrogressive course. A nation's transition to a more active public life is in itself already apt to assign to one-sided scholasticism a more retired position in the background. But if, as happened during the second half of our century, the current of natural science coincides in a more permanent manner with political and social incentives, the scope for an independent assertion of ideological metaphysics is more and more circumscribed. This is the reason why only those tendencies of philosophy may yet hope to exert any influence upon life out of their own underived power, which really devote their interest to this life. In this respect Mill is a philosopher of modern type by virtue of his applying his philosophy to the political, economical and social questions of the present time. Externally considered he has pretty equally divided his efforts between logic and national economy. For England this combination of a theory of material interests with philosophy is nothing new. Hume had already been its most brilliant representative; and he who values to any extent Adam Smith's theory of moral sentiments, will not be surprised if we maintain that the somewhat more strictly philosophical foundations and forms for the theory of material interests have originated with philosophers. Locke had already made a beginning in this direction, and it was unmistakably the former political development of England which just then called the phenomenon in question into early existence. But now this theoretical approximation of material and intellectual aspirations can no longer surprise us in those States which are the principal bearers of civilization. Not only is the character of this whole epoch directed to economical and political questions, but in the most influential among the civilized States a new prospect for an uncommon intensification of political consciousness has been opened. Under these circumstances which are comparatively new to us Germans as that nation which most recently entered upon this tendency, we have no reason for wondering at the preparatory changes which have been introduced in the location of the center toward which philosophical thoughts gravitate. The interest which Mill has excited among us from this point of view, is quite natural, and our own philosophy will also gradually learn how to reconcile the better traditions and the still vigorous power of the German mind with the demands of a more conscious public life. Not a peculiar disposition, turned toward one-sided

metaphysical science, but the fact, that the public career of the German nation only of late reached the point where other nations had arrived at a much earlier period, accounts for the transcendental and dreamy character of our profoundest metaphysical systems. It is therefore not necessary to abandon the conviction of the merits and high rank of German philosophy. On the contrary even the idea of a special philosophical mission may be adhered to, and yet the expectation cherished, that German philosophy will also seriously grapple with the reality of life, and even where it aspires to the highest aims will not much longer forego the alliance of its conception of the world and of life with the actual importance of material interests.

The new problems which socially have produced the most important results in France, and which in our days seriously occupy the world not only on this but also on the other side of the Atlantic, can be indifferent only to decaying scholasticism, but not to any philosophy which lays claim to vitality. The horizon which has been enlarged by political interest and the prevalence of statistic and historical statements of facts, compels even those who of their own accord would rather keep within the magic circles of more secluded metaphysical science, to manifest occasionally another tendency of ideas, or at least its semblance. Thus often the strangest mixtures originate, to be sure; but nevertheless these phenomena mark the influence which the spirit of the modern era exerts even upon those who do not understand it. Before the thinker of original power our time partly lays entirely new problems, partly offers to him old problems in a considerably changed form. If in this respect any comparison is admissible, it resembles the sixteenth century particularly in this, that its character rests upon the coincidence of a number of events and factors of civilization of the first rank.

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